READ THIS MANUAL CAREFULLY!
It contains important safety information.
Keep it for future reference.

SLICE CARBON

Owner's Manual Supplement

120849.PDF

CONTENTS

SAFETY INFORMATION 1
- About This Supplement 2
- Important Composites Message 3
- Intended Use 3
- Building Up A Frameset 4
- Extreme Temperatures 4
- Bike Stands 4
- Inspection and Crash Damage 5
- Repainting and Refinishing 5

SERIAL NUMBER 6

CABLE ROUTING 6

SEAT POST 8
- Saddle Position/Angle 8
- 80mm MINIMUM INSERT 9
- Cutting the Seat Post 9
- Seat Post Parts 10
- Changing Saddle Position 11

SI BOTTOM BRACKET SHELL 12
- Compatibility 12
- Bearings 9
- SI Tools 11
- 68mm Standard Adapter 12

SI COMPRESSION ASSEMBLY 14

CHAINSTAY PROTECTION 16

REAR DERAILLEUR HANGER 16

REAR BRAKE MOUNT ADAPTER 17

GEOMETRY/SPECIFICATION 18

REPLACEMENT PARTS 19

Please note that the specifications and information in this manual are subject to change for product improvement. For the latest product information, go to http://www.cannondale.com/tech/.

SAFETY INFORMATION

About This Supplement

Cannondale Owner's Manual Supplements provide important model specific safety, maintenance, and technical information. They are not replacements for your *Cannondale Bicycle Owner's Manual*.

This supplement may be one of several for your bike. Be sure to obtain and read all of them.

If you need a manual or supplement, or have a question about your bike, please contact your Cannondale Dealer immediately, or call us at one of the telephone numbers listed on the back cover of this manual.

You can download Adobe Acrobat PDF versions of any Cannondale Owner's Manuals or Supplements from our website: http://www.cannondale.com/bikes/tech.

- This manual is not a comprehensive safety or service manual for your bike.
- This manual does not include assembly instructions for your bike.
- All Cannondale bikes must be completely assembled and inspected for proper operation by a Cannondale Dealer before delivery to the owner.

⚠ WARNING

This supplement may include procedures beyond the scope of general mechanical aptitude.

Special tools, skills, and knowledge may be required. Improper mechanical work increases the risk of an accident. Any bicycle accident has risk of serious injury, paralysis or death. To minimize risk we strongly recommend that owners always have mechanical work done by an authorized Cannondale retailer.

⚠ WARNING

IMPORTANT COMPOSITES MESSAGE

Your bike is made from composite materials also known as "carbon fiber.".

All riders must understand a fundamental reality of composites. Composite materials constructed of carbon fibers are strong and light, but when crashed or overloaded, carbon fibers do not bend, they break.

For your safety, as you own and use the bike, you must follow proper service, maintenance, and inspection of all the composites (frame, stem, fork, handlebar, seat post, etc.) Ask your Cannondale Dealer for help.

We urge you to read PART II, Section D. "Inspect For Safety" in your *Cannondale Bicycle Owner's Manual* BEFORE you ride.

YOU CAN BE SEVERELY INJURED, PARALYZED OR KILLED IN AN ACCIDENT IF YOU IGNORE THIS MESSAGE.

Intended Use

The intended use of your bike or frameset is CONDITION 1 / HIGH PERFORMANCE ROAD.

CONDITION 1 / HIGH-PERFORMANCE ROAD bikes and framesets are designed for riding on a paved surface where the tires do not lose ground contact. They are not intended to be ridden off-road, cyclocross, or touring with racks or panniers.

Material use is optimized to deliver both light weight and specific performance. You must understand that (1) these types of bikes are intended to give an aggressive racer or competitive cyclist a performance advantage over a relatively short product life, (2) a less aggressive rider will enjoy longer frame life, (3) you are choosing light weight (shorter frame life) over more frame weight and a longer frame life, (4) you are choosing light weight over more dent resistant or rugged frames that weigh more. All frames that are very light need frequent inspection for cracks that would indicate that the frame is worn out from fatigue. These frames are likely to be damaged or broken in a crash. They are not designed to take abuse or be a rugged workhorse.

⚠ WARNING

UNDERSTAND YOUR BIKE AND ITS INTENDED USE. CHOOSING THE WRONG BICYCLE FOR YOUR PURPOSE CAN BE HAZARDOUS. USING YOUR BIKE THE WRONG WAY IS DANGEROUS.

Industry usage Conditions 1 - 5 are generalized and evolving. Consult your Cannondale Dealer about how you intend to use your bike.

Please read your *Cannondale Bicycle Owner's Manual* for more information about Intended Use and Conditions 1-5.

Maximum Weight Limit

RIDER lbs / kg	LUGGAGE * lbs / kg	TOTAL lbs / kg
275 / 125	10 / 4.5	285 / 129

* Seat Bag /Handlebar Bag Only

Building Up A Frameset

Before building up a frameset, consult with your Cannondale Dealer and the component manufacturers, and discuss your riding style, ability, weight, and interest in and patience for maintenance.

Make sure the components chosen are compatible with your bike and intended for your weight and riding style.

Generally speaking, lighter weight components have shorter lives. In selecting lightweight components, you are making a trade-off, favoring the higher performance that comes with less weight over longevity. If you choose more lightweight components, you must inspect them more frequently. If you are a heavier rider or have a rough, abusive or "go for it" riding style, buy heavy duty components.

Read and follow the component manufacturers warnings and instructions.

Protect From Extreme Temperatures

• Protect your carbon bike from extreme temperatures when storing or transporting it.

• Allow your bike to cool off or warm up before you ride

• Do not store your bike in places where the temperature will exceed 66.5C° (150°F). For example, do not leave your bike lying flat in a black pickup truck bed in the desert sun or under the glass of a hatchback auto.

Bike Stands

The clamping jaws of ordinary bike stand can generate a crushing force strong enough to seriously damage and ruin your bike frame.

CAUTION

SERIOUS FRAME DAMAGE:

DO NOT USE STANDS THAT CLAMP TO THE FRAME OR SEAT POST.

USE A STAND THAT RELIES ON SUPPORTING THE BOTTOM BRACKET AND DROPOUTS. (Park Tool, PRS-20 shown)

Inspection & Crash Damage of Carbon Frames

WARNING

AFTER A CRASH OR IMPACT:

Inspect frame carefully for damage (See PART II, Section D. Inspect For Safety in your Cannondale Bicycle Owner's Manual.)

Do not ride your bike if you see any sign of damage, such as broken, splintered, or delaminated carbon fiber.

ANY OF THE FOLLOWING MAY INDICATE A DELAMINATION OR DAMAGE:

An unusual or strange feel to the frame

Carbon which has a soft feel or altered shape

Creaking or other unexplained noises,

Visible cracks, a white or milky color present in carbon fiber section

Continuing to ride a damaged frame increases the chances of frame failure, with the possibility of injury or death of the rider.

Repainting Or Refinishing

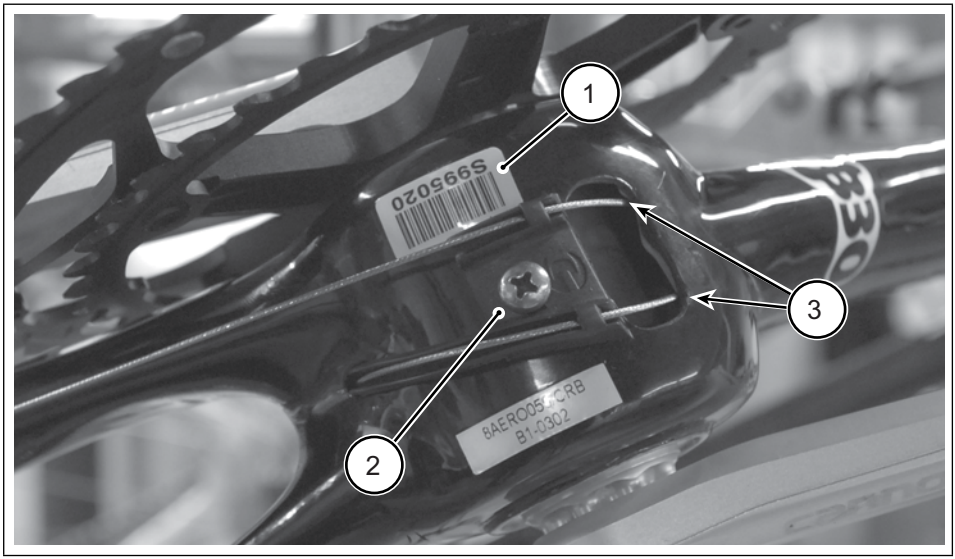
You should not paint over the existing finish, refinish or repaint your bike. The carbon fiber composites making up the frame are held together by some extremely strong bonding chemicals. However, these bonds can be attacked or weakened by paint stripping or refinishing chemicals.

WARNING

Repainting, painting over, retouching, or refinishing your frame or fork can result in severe damage leading to an accident. You can be severely injured, paralyzed or killed.

Refinishing chemicals : Solvents, and strippers can attack, weaken, or destroy the important composite chemical bonds holding your frame together.

Using abrasives or sanding the frame/fork structure, original paint, decals, or coatings through the use of mechanical actions such as plastic or glass bead blasting or other abrasive methods such as sanding or scraping can remove frame material or weaken it.



SERIAL NUMBER

The serial number (1) printed and permanently affixed barcode label. Use this serial number for warranty registration and theft recovery. See your *Cannondale Bicycle Owner's Manual* for more information on warranty registration.

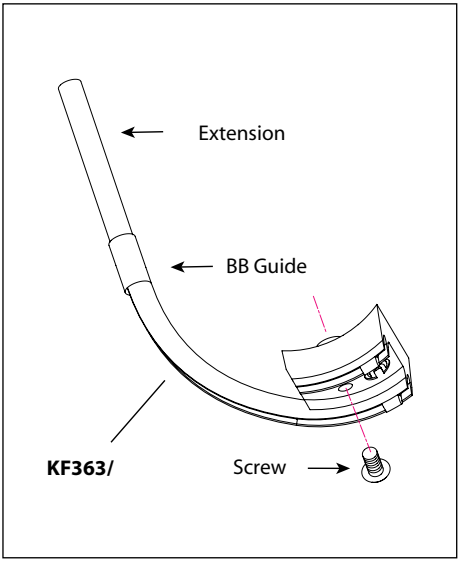
CABLE ROUTING

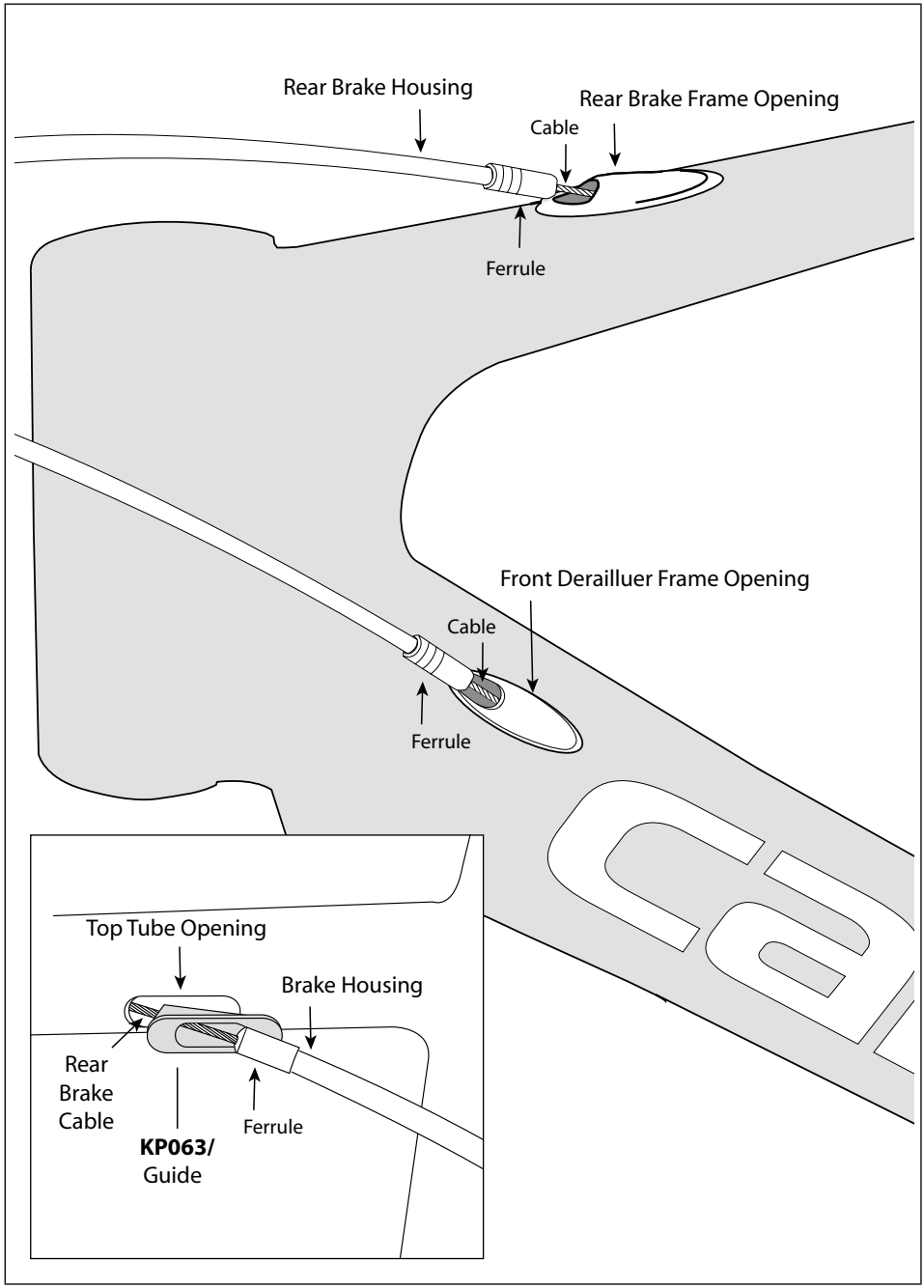
The rear and front derailleur cables exiting the down tube (2) are routed through the bottom bracket cable guide (3).

The top tube guide is removable so that brake cable may be routed inside the tube. The guide is secured in the tube opening by the installed brake cable tension. Make sure the guide is seated properly in the top tube opening when installing and connecting the rear brake.

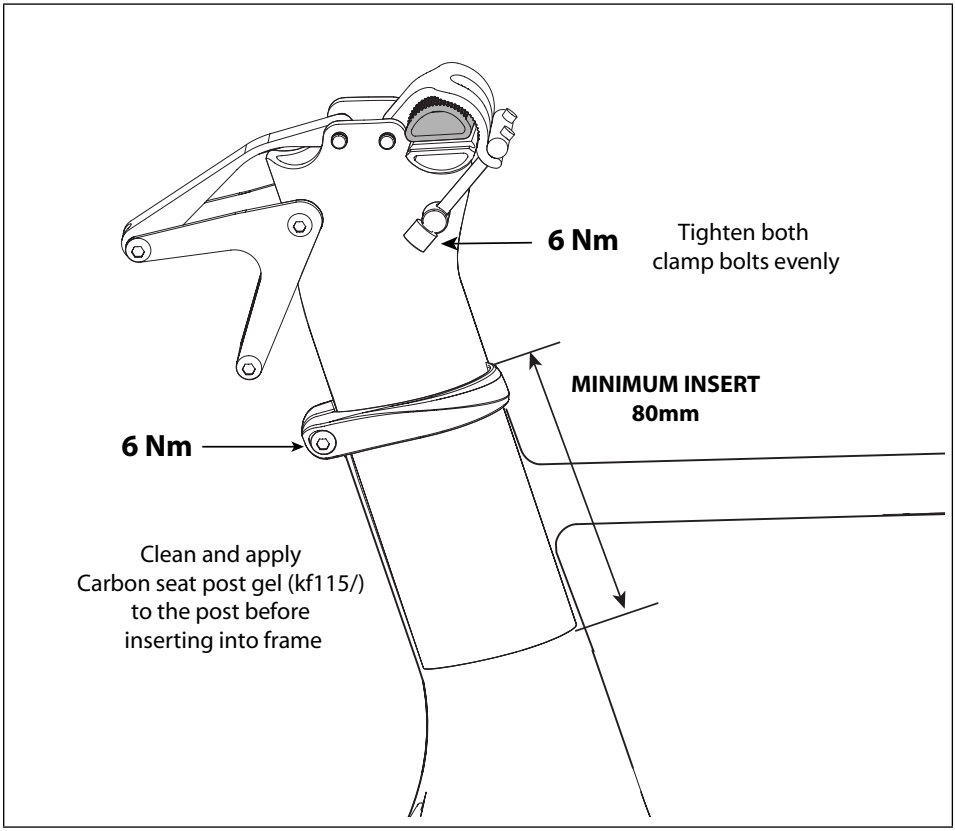
Be sure to use a ferrules on housing ends.

When installing cables, make sure ferrule is seated inside frame opening correctly.




Rear Brake Housing
Rear Brake Frame Opening
Cable
Ferrule
Front Derailluer Frame Opening
Cable
Ferrule
Top Tube Opening
Brake Housing
Rear
Brake
Cable
Ferrule
KP063/
Guide

SEAT POST



Saddle Position and Angle

The seat post can be configured to place the saddle in a TRIATHLON or TIME TRIAL position. Please see "Changing Saddle Position" on pages 9 and 10. The water bottle cage bracket parts can only be used with saddle in the TRIATHLON position (shown above). Two water bottle cages may be mounted on the sides of the seat post, or a single cage can be mounted on the back.

Saddle angle can be adjusted by rotating the upper saddle clamp 180°. The change is 3° per groove. If the upper saddle clamp orientation is reversed 180°, saddle adjustment range will change ±1.5° in relation to 0° , again with 3° of change per groove. Ask a professional bike mechanic to show you how this works.

80mm Minimum Insert

The minimum insert depth that the seat post must be inserted into the frame is 80mm. Seat posts are permanently marked with 'MINIMUM INSERT" line 80mm up from the bottom of an un-cut seat post.

Cutting the Seat Post

In some frames (especially smaller sizes), a seat post will only be able to be inserted into a seat tube to a maximum depth of 100 mm. Below a depth of 100mm carbon material can interfere with the seat post. The material can not be removed.

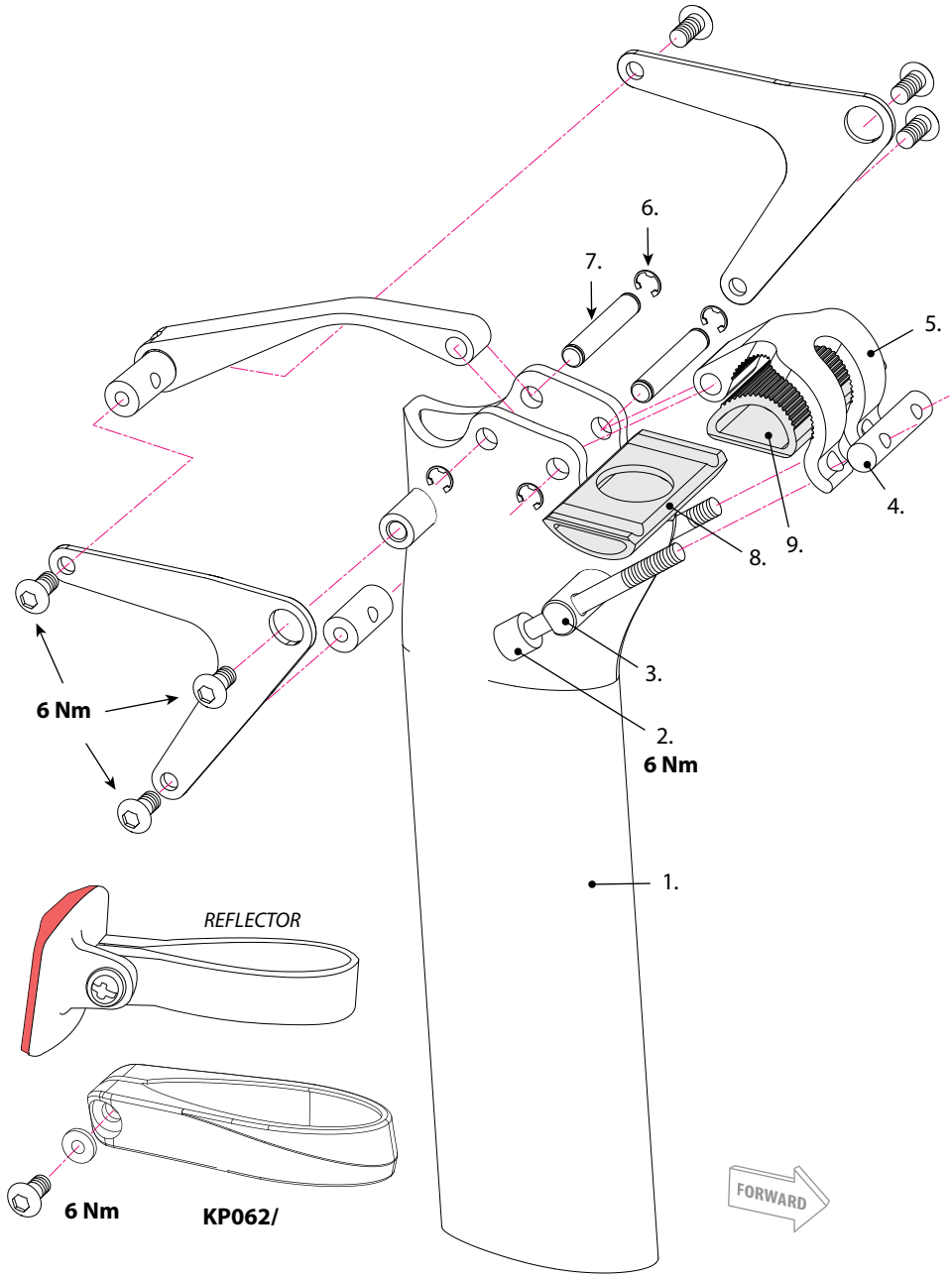
The full length of the seat post can be cut down to have sufficient adjustment range. The minimum insertion depth requirement of 80mm does not change. 80mm should be marked from the bottom of a cut seat post. The seat post may be cut (shortened). A new "MINIMUM INSERT" line 80mm from the bottom of the post must be marked or indicated without scoring, scratching or otherwise damaging the surface of the seat post. Use a thin decal (automotive pin striping) or permanent marker.

⚠ WARNINGS

TO AVOID SERIOUS SEAT POST OR FRAME DAMAGE:

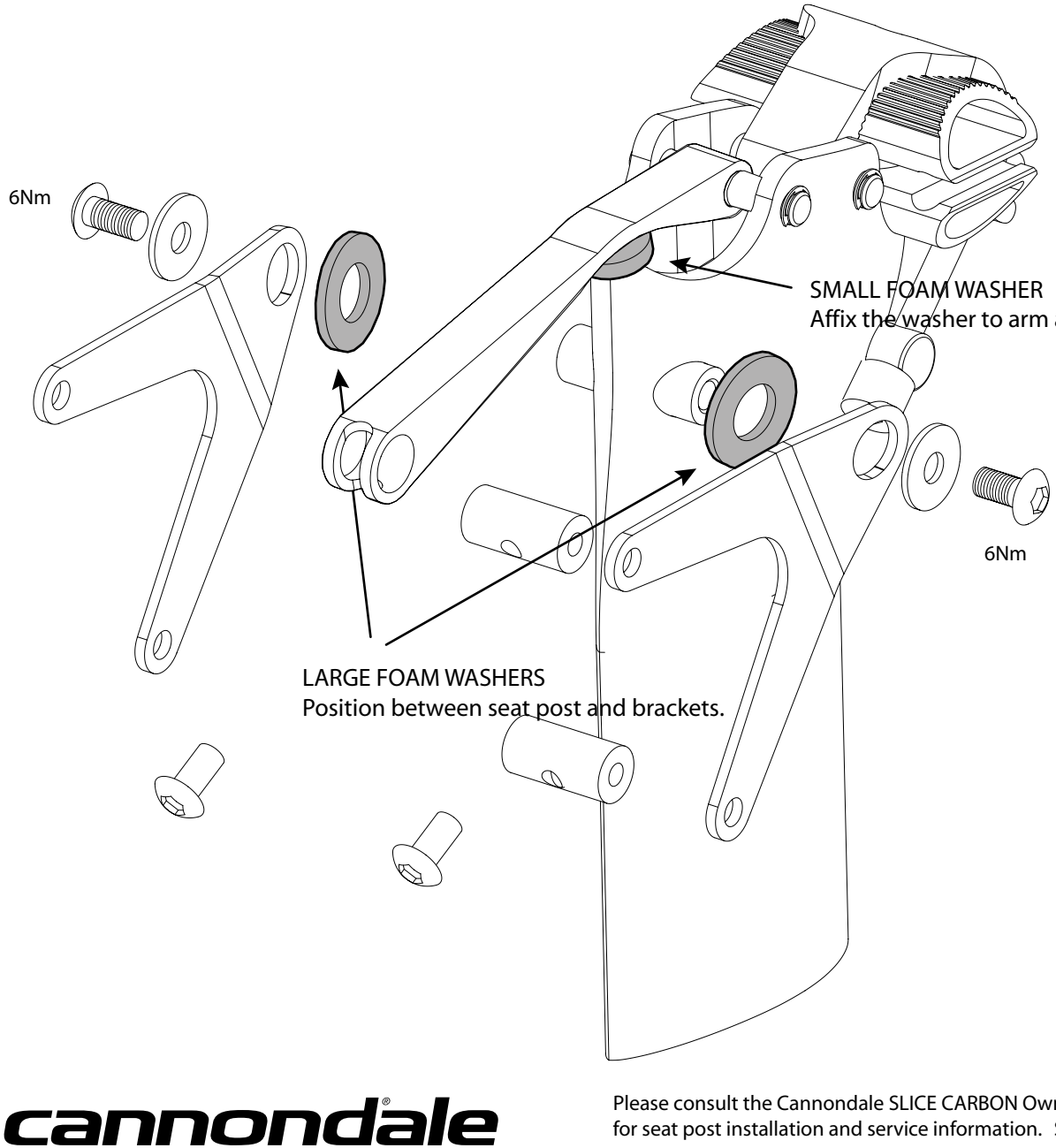
1. After any crash, fall, or impact, remove and inspect the seat post for damage (e.g., cracks, scratches, scrapes, gouges, splintering). If damage is found, do not ride it; discard it. Replace the seat post with a new one.
2. Do not use solvents, or chemical spray cleaners to clean.
3. Never force a seat post into the seat tube.
4. Use a good torque wrench to tighten fasteners to the specified torque. Correct tightening torque of the seat post clamp and the bolts that hold the saddle to the seat post is also very important to your safety. Always tighten seat post to saddle clamp bolts to the correct torque. Bolts that are too tight can stretch and deform. Bolts that are too loose can move, fatigue and fracture. Either mistake can lead to a sudden failure of these bolts. Such a failure may lead to an accident, with risk of serious injury, paralysis or death.
5. If the seat post requires cutting, have it done by a professional bike mechanic with experience cutting high-performance carbon components.

YOU CAN BE SEVERELY INJURED, PARALYZED OR KILLED IF YOUR IGNORE THESE WARNINGS.

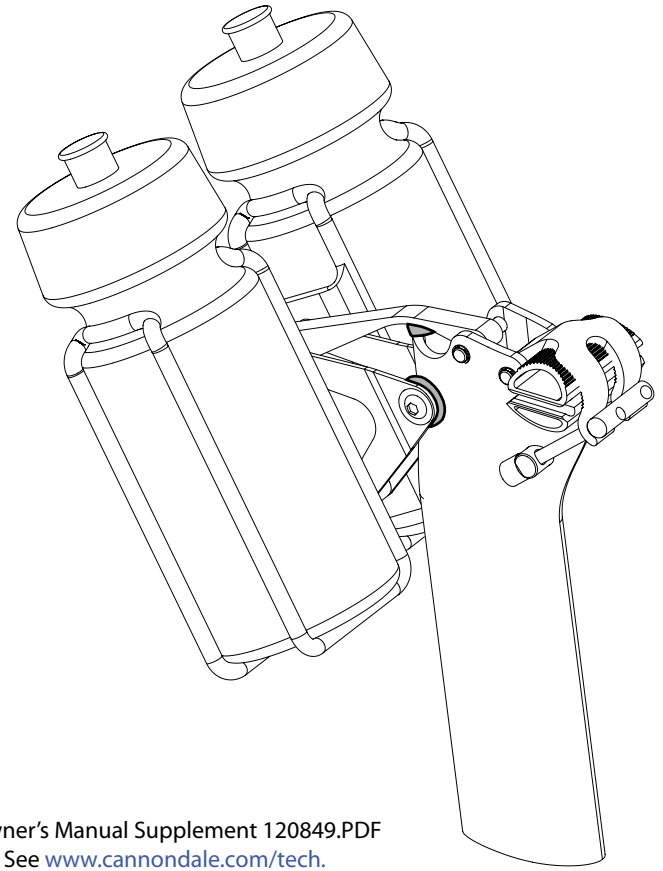

6.
7.
5.
4.
8.
9.
3.
2.
6 Nm
6 Nm
1.
REFLECTOR
6 Nm
KP062/
FORWARD

2008 SLICE MULTISPORT SEATPOST

Water Bottle Bracket Assembly Update Parts



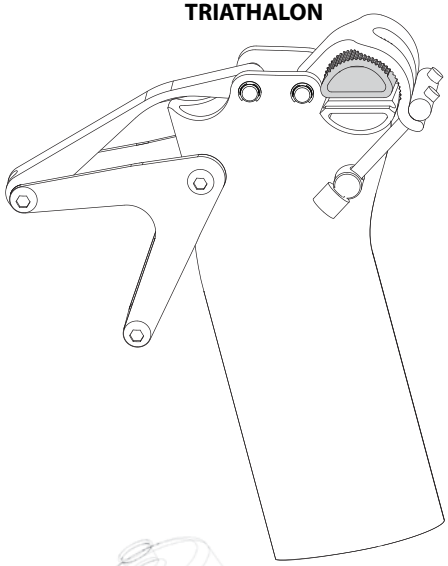
To obtain the update parts,
please contact a Cannondale Dealer.



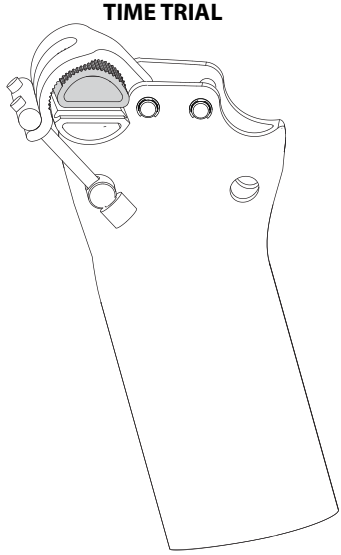
cannondale®

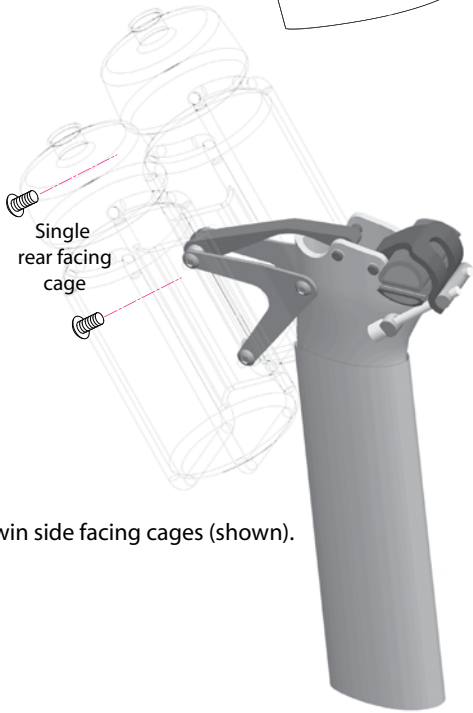
Please consult the Cannondale SLICE CARBON Owner's Manual Supplement 120849.PDF for seat post installation and service information. See www.cannondale.com/tech.

TRIATHALON



TIME TRIAL





Twin side facing cages (shown).

Changing Saddle Position

1. Remove the saddle clamp bolts (2) and remove clamp barrel (3), upper clamp (9), lower clamp (8), and barrel (4).
3. Remove the circlips (6).
4. Reposition clamp over (5) and use other pin (7) and reinstall pin and all four circlips (6). Make sure all four circlip are seated in the pin grooves.
5. Reinstall the saddle, clamp bolts, and tighten the clamp bolts evenly to the specified torque.

SI BOTTOM BRACKET

Compatibility

The BB shell is compatible with the BB30 Standard. See http://www.bb30standard.com/ For information see *SI Cranksets Owner's Manual Supplement*. See http://www.cannondale.com/tech/.

Bearings

Shell bearings are sealed cartridge type and do not require lubrication. Inspect bearing condition annually (at a minimum) and anytime the crankset assembly is disassembled or serviced. The bearings are a press fit within the shell. Old bearings should not be reinstalled if removed. Replace both bearings at the same time.

Replacements circlips (QC616/) are available if the circlips become damaged. The circlips can be lifted from the BB groove (inset) by lifting the hooked end with a thin blade screwdriver.

CAUTION

DO NOT FACE, MILL OR MACHINE THE BOTTOM BRACKET SHELL FOR ANY REASON. Doing so can result in serious damage and possibly a ruined bike frame.

SI Tools

KT011/ is a bearing removal tool.

KT010/ is a set of bearing installation tools to be used with a standard headset press.

KT013/ a two piece tool set required for removing the crankarms SI Hollowgram alloy cranksets.

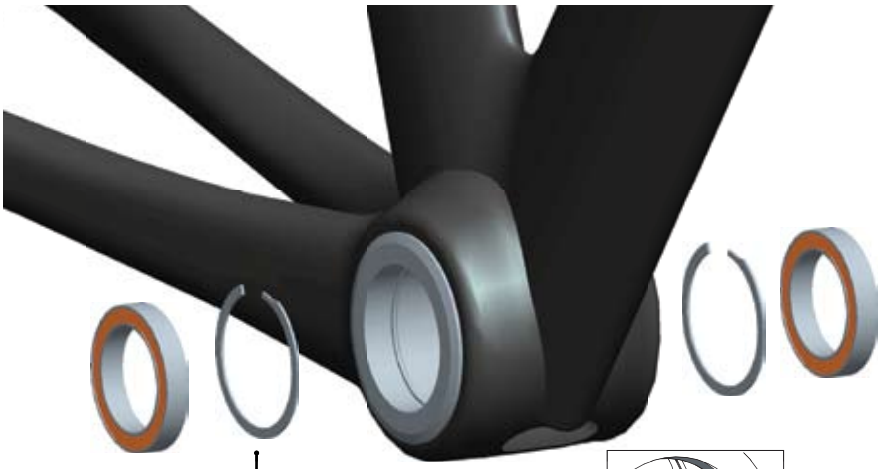
For information see *SI Cranksets Owner's Manual Supplement*. See http://www.cannondale.com/tech/.

SI BB30-to-68mm Standard Adapter

The adapter (Cannondale kit KF365/) converts the BB30 bottom bracket cranksets for use with 68mm bottom brackets. The adapter IS NOT a repair part and will only work in undamaged frames in good condition. Improper installation or removal can result in damage and void applicable frame warranty.

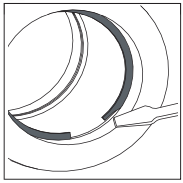
CAUTION

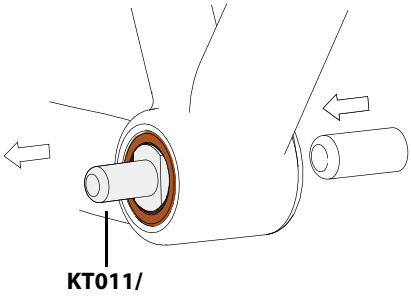
SERIOUS FRAME DAMAGE : Once installed, the SI-to-Standard adapter is a non-removable/permanent frame part. Do not remove it. Adapters must be installed by a professional bike mechanic.



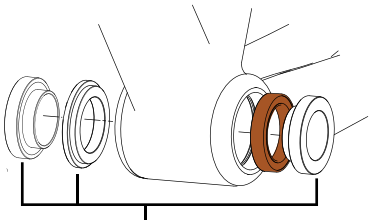
KB6180/
KP018/ *(ceramic)*

QC616/

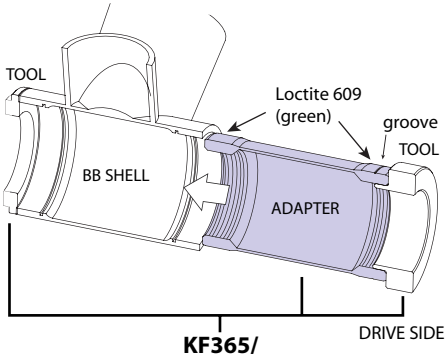




KT011/

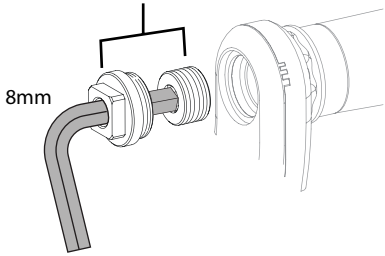


KT010/



KF365/

KT013/



SI COMPRESSION ASSEMBLY

The cylindrical shape of the TOP CAP fits snugly within the carbon steering tube inside diameter (I.D.), supporting the steerer from the clamping force of the stem. It must fit snugly inside the I.D. of the steerer.

How to install the assembly

1. Assemble the fork, headset, spacers, and stem. Make sure that the stem bolts are loose.
2. Set up the compression assembly. "READY TO INSERT" above. The length should be about 48mm as shown above. You can do this by unthreading the top cap from the expander and then threading it back on about 6-7 turns. The expanding parts should not be expanded.
3. Insert the SI compression assembly into the fork steerer. It should slide in snugly; the TOP CAP closely fitting the steerer inside diameter.
4. Insert a 5mm Allen key through the access hole in the TOP CAP and into the EXPANDER BOLT. Tighten the expander by turning clockwise to 6.8Nm, 5 ftLbs.
5. To set bearing preload, insert a 6mm allen key into the hex shape in the TOP CAP iteself. Turn the entire TOP CAP clockwise to increase preload. Turn counter-clockwise to decrease preload.
6. When the headset preload is correct, align handlebar and tighten the stem fork clamp bolts to the torque specified for the stem. Consult the stem since torque values are often marked on the stem, or consult the manufacturer's instructions.

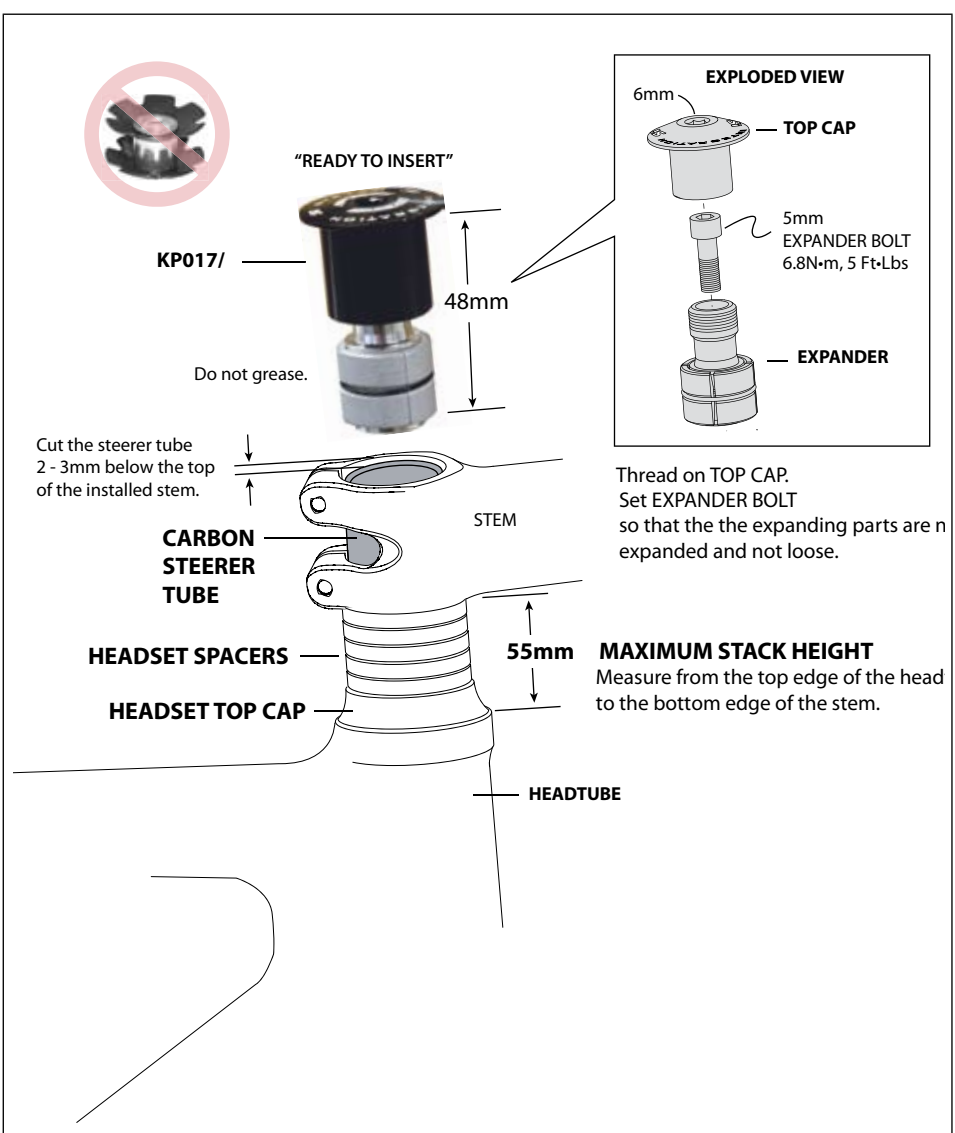
⚠ WARNINGS

USE ONLY ORIGINAL EQUIPMENT CANNONDALE SI COMPRESSION ASSEMBLY. Do not replace it with a star nut or use any other compression or expanding wedge assembly.

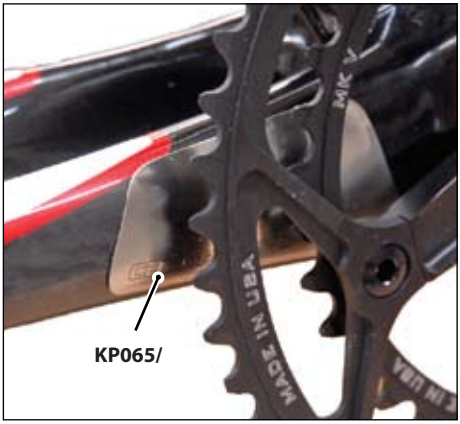
DO NOT INSTALL HEADSET SPACERS ON TOP OF THE STEM. Installing spacers above the stem will raise the TOP CAP inside the steerer removing necessary support for the steerer tube wall. When stem bolts are tightened. the steerer tube can be damaged.

PLACE HEADSET SPACERS ONLY BETWEEN THE HEADTUBE AND THE BOTTOM OF THE STEM.

YOU CAN BE SEVERELY INJURED, PARALYZED OR KILLED IF YOUR IGNORE THESE WARNINGS.



For more information on Cannondale Carbon Road Forks, please see your Carbon Road Fork Owner's Manual Supplement 120860.pdf included with your bike or download it from our website http://www.cannondale.com/tech_center/



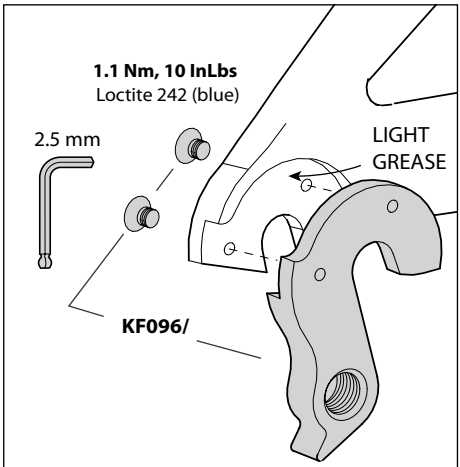
CHAINSTAY PROTECTION

The chainstay plate (KP065/) located on the right chainstay just behind the chain rings, protects the chainstay from damage in the event the chain is dropped from the chain ring. Contact your Cannondale Dealer for a replacement if it is becomes missing or damaged. The clear chainstay protector (above right) provides limited protection against frame or finish damage caused by the chain. Replacement protectors are available through a Cannondale Dealer.

REAR DERAILLEUR HANGER

Before re- installing (same or new): Clean dropout and inspect carefully for any cracks or damage. Clean surfaces and apply a light film of bike grease to the dropout to minimize any noise or "creaking" that might result from very slight movement between the dropout and hanger during movement of the derailleur. Apply grease and Loctite carefully. Do not contaminate the male or female bolt threads with grease which would cause the Loctite to be ineffective.

Check derailleur adjustment after replacement. Readjust wheel quick release so it is very tight. See PART I Section 4. A in your Cannondale Bicycle Owner's Manual.



CAUTION

DO NOT USE A DERAILLEUR HANGER ALIGNMENT TOOL TO STRAIGHTEN.

REAR BRAKE MOUNT ADAPTER

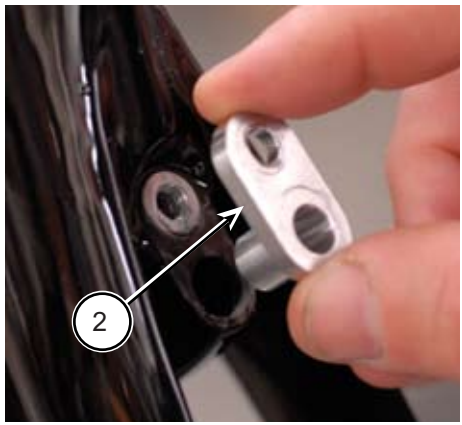
To install a rear brake:

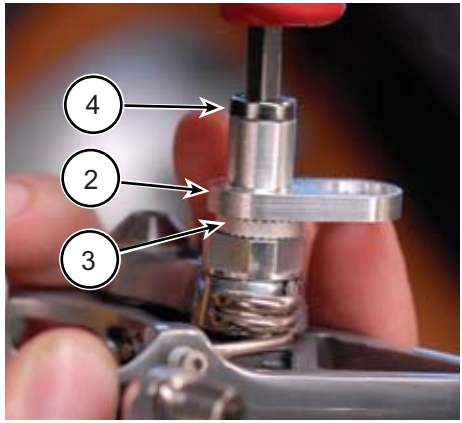
1. Remove the adapter bolt (1) with a 4mm Allen wrench.
2. Lift the brake mount adapter (2) from the frame.
3. Install a serrated washer (3) onto the brake bolt and mount the brake onto the adapter.

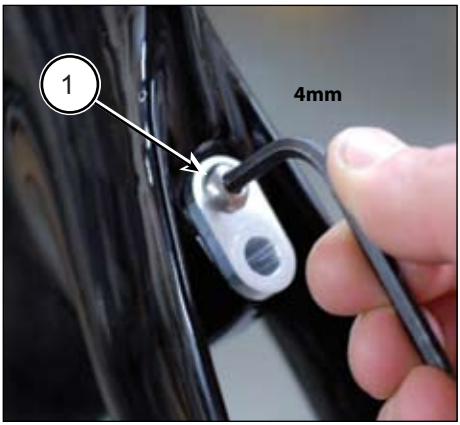
   Tighten the brake recessed nut (4) to the brake manufacturer's recommended torque.
4. Apply grease to adapter bolt threads and install adapter and brake into frame.

   Tighten adapter bolt to 7 Nm.

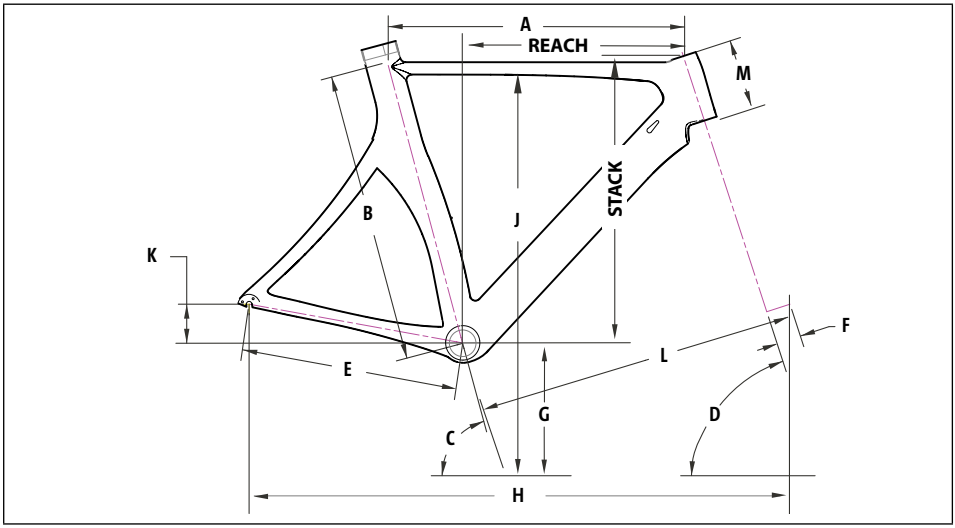
Replacement brake mount kit - KP064/







GEOMETRY/SPECIFICATION



ITEM		51	54	56	56	60
Wheel Size		700c	700c	700c	700c	700c
Horizontal Top Tube Length (cm)**	A	50.5	53.5	55.0	56.5	58.0
Measured Size (cm)	B	50	51.5	53.5	55.5	57.5
Seat Tube Angle*	C	75°	75°	75°	75°	75°
Head Tube Angle	D	71.5°	71.5°	72°	72°	72°
Chainstay Length	E	40	40	40	40	40
Fork Rake	F	4.5	4.5	4.5	4.5	4.5
Bottom Bracket Height (cm)	G	26.5	26.5	26.5	26.5	26.5
Wheelbase (cm)	H	95.4	98.5	99.7	101.3	102.6
Trail (cm)	I	6.5	6.5	6.2	6.2	6.2
Standover @ Top Tube Midpoint	J	74.9	76.4	78.3	80.2	82.2
Bottom Bracket Drop (cm)	K	72	72	72	72	72
Front Center Distance (cm)	L	56.5	59.6	60.7	62.3	63.9
Head Tube Length (cm)	M	9.0	10.5	12.5	14.5	17
STACK (cm)***		49.4	50.9	52.9	54.8	57.2
REACH (cm)***		37.1	39.8	40.7	41.7	42.5
Headset Compression		Cannondale SI Compression Assembly - KP017/				
Seatpost Minimum Insert Depth.		80mm				
Seat Binder		KP062/			MAXIMUM TORQUE 6Nm	
Rear Brake Mount Adapter Bolt		7Nm				
Dropout Spacing		Rear 130mm, Front 100mm				

** The Slice seat post has two positions for mounting the saddle. A full range of angles from 73° to 78° is achievable depending on rider's preference and/or the event.*

*** This is the actual measurement of the top tube. The distance from the saddle to the bars will vary based on the choice of seat post position.*

**** STACK and REACH - STACK is measured vertically from the center of the BB to the top of the head tube; REACH is measured horizontally from the center of the BB to the top of the head tube.*

If you ride a 56 road frame, you should choose a size 56 Slice frame.

REPLACEMENT PARTS

ORDER	FRAME	
KF363/	BB CABLE GUIDE w/fixing bolt	
KF055/	INLINE ADJUSTER (QTY 2)	
KP061/	SEAT POST SLICE AERO	
KP062/	SEAT BINDER SLICE AERO	
KP060/	SEAT POST HARDWARE SLICE AERO	
KF115/	SEAT POST GEL	
KP065/	CHAINSTAY PROTECT-AERO SLICE	
KF096/	REAR DERAILLUER HANGER	
KP064/	BRAKE GUIDE SLICE AERO	
ORDER	HEADSET & FORK PARTS	
KB002/	KIT,HEADSET,SI CRB W/15 TC	
QC778/	BRAKE BOLT(35mm)	
KP017	SI COMPRESSION ASSY	
ORDER	SI BB30	
BOTTOM BRACKET		
QC616/	SI CIRCLIPS (QTY 2)	
KB6810/	SI BEARINGS (QTY 2)	
KP018/	SI CERAMIC BEARINGS (QTY 2)	
QC615/	SI BEARING SHIELD (QTY 2)	
KP023/	SI BEARING SHIELD SL (QTY 2)	
QC612/	SPINDLE-SI ROAD	
QC617/	SI SHIMS (QTY 5)	
QC618/	SI WAVE WASHER	
TOOLS		
KT010/	SI BEARING PRESS TOOL(USED WITH HEADSET PRESS)	
KT011/	SI BEARING REMOVAL TOOL	
KT012/	SI LOCKRING TOOL	
KT013/	SI HOLLOWGRAM CRANKARM EXTRACTION TOOL	
KF365/	SIBB/68 ADP.INSTALL	
QC787/	EXTRACT CAP TOOL FOR SI CARBON CRANKSETS	
KP009/	ADAPTER,SIBB TO 68MM TAP	

For an up to date list of kits available for your bike, please visit our Tech Center at : http://www.cannondale.com/bikes/tech/

ORDER	SI HOLLOWGRAM	
	SI HOLLOWGRAM CRANKSETS	
KA014/170SLV	CRANKSET,SL,ROAD 39/53,170	
KA014/172SLV	CRANKSET,SL,ROAD 39/53,172	
KA014/175SLV	CRANKSET,SL,ROAD 39/53,175	
KA015/170SLV	CRANKSET,SL,ROAD 34/50,170	
KA015/172SLV	CRANKSET,SL,ROAD 34/50,172	
KA015/175SLV	CRANKSET,SL,ROAD 34/50,175	
KP019/170L	CRANKARM-SL SLV,170 LFT	
KP019/172L	CRANKARM-SL SLV,172 LFT	
KP019/175L	CRANKARM-SL SLV,175 LFT	
KP019/170R	CRANKARM-SL SLV,170 RHT	
KP019/172R	CRANKARM-SL SLV,172 RHT	
KP019/175R	CRANKARM-SL SLV,175 RHT	
QC690/	BB,CDALE Si,68X104mm Rd	
QC850/	B,CDALE Si,68X104mm Rd-SRM	
KA019/	BB,CDALE Si,68X104 CERAMIC	
ORDER	SI CARBON	
QC781/	CRANKSET,CRB 2PC,39/53,170	
QC782/	CRANKSET,CRB 2PC,39/53,172	
QC783/	CRANKSET,CRB 2PC,39/53,175	
QC784/	CRANKSET,CRB 2PC,34/50,170	
QC785/	CRANKSET,CRB 2PC,34/50,172	
QC786/	CRANKSET,CRB 2PC,34/50,175	
KF361/	BOLTS, SI CARBON CRANK (QTY 2)	
QC787/	TOOL-EXTRACT. CAP.SI CRB	
ORDER	SI CHAINRINGS/SPIDER	
QC694/	Spider,H-GRAM SI,130MM BCD	
QC693/	Spider,H-GRAM SI,110mm BCD	
QC603/	Pin,Chain Catch-SI	
KP024/	CHAINRING,MK5-53T/130BCD	
KP025/	CHAINRING,MK5-39T/130BCD	
KP026/	CHAINRING,MK5-50T/110BCD	
KP027/	CHAINRING,MK5-34T/110BCD	
KP021/	LOCKRING-SL --REQUIRES KT012/	
QC789/	CHAINRING,SI,39T/130BCD	
QC790/	CHAINRING,SI,53T/130BCD	
QC791/	CHAINRING,SI,34T/110BCD	
QC792/	CHAINRING,SI,50T/110BCD-34Tspecific	
QC788/	BB,CDALE SI,2PC	

WARNING THIS MANUAL CONTAINS IMPORTANT SAFETY, PERFORMANCE AND SERVICE INFORMATION.

Read it before you take the first ride on your new bicycle, and keep it for reference.

BICYCLE OWNER'S MANUAL BICYCLE

cannondale®

CONGRATULATIONS ON YOUR PURCHASE OF A CANNONDALE BICYCLE.

Before you roll off towards the horizon, there are a few things you should know about us and our products:

1. We think riding a bike is fun! Which means all of us at Cannondale are lucky enough to do what we enjoy. You'll see that dedication to our craft in every bicycle we make.
2. Our dedication to craft includes dreaming up new ways to pioneer improvements for the industry – things like System Integration and the BB30 Standard. Later, other manufacturers often "borrow" our ideas, but that's okay. After all, more people on bikes is good for everyone.
3. Because bike riding is so much fun, we encourage you to partake whenever the whim strikes you: Going to the grocery store, going to work, going to school, or wherever you go. Bikes are serious transportation, in addition to being outrageously good fun.
4. To keep your bike in top condition and to minimize risk, please refer to this manual whenever you have questions about its operation.
5. We encourage you to visit your local Independent Bike Dealer. Many of us had our first jobs in bike shops, and your local Cannondale dealer is an important source of information for you.

Vélo certifié conforme aux exigences du décret N 95-937 du 24 août 1995 norme NFR030

USE OF THIS MANUAL

Cannondale Bicycle Owner's Manual

This manual contains important information affecting your safety and the proper use of bicycles. It is a very important manual for every bike we make. It is organized into two parts:

PART I

Is a generic guide to the proper function and use of bicycles. This generic information is used by many bike companies. Most aspects of bicycles are common or "generic." PART I of this manual is the 9th edition of the generic manual.

PART II

Contains Information specific to Cannondale bicycles and topics we feel you need to know and understand about our bikes.

A manual alone cannot teach you how to ride, and a manual the size of an encyclopedia could not cover every combination of bicycle, rider and conditions. Thus, as a reasonable person would expect, the Cannondale manuals and supplements focus on the bicycle, not teaching you to ride.

This manual is not intended as a comprehensive use, service, repair or maintenance manual. It contains no assembly instructions. This manual is not a service manual for any parts of your bike. Please see your dealer for all service, repairs or maintenance. Your dealer may also be able to refer you to classes or books on bicycle use, and maintenance.

Owner's Manual Supplements

Cannondale Owner's Manual Supplements are "supplements" to this manual providing important additional model specific safety, maintenance, and technical information. Cannondale Owner's Manual Supplements are not replacements for this or any other manual for your bike.

You can download Adobe Acrobat PDF versions of any Cannondale Owner's Manual or Owner's Manual Supplements or Tech Notes from our website. Go to: http://www.cannondale.com/bikes/tech/.

Other Manuals & Instructions

Many of the components on your bike were not made by Cannondale. When available from the manufacturer, Cannondale packages these manuals and/or instructions with our bikes for delivery to you. We strongly recommend that you read and follow all the manufacturer's specific instructions included with your bike.

Authorized Cannondale Retailers

Your local Authorized Cannondale Retailer is your primary contact for service and adjustment of your bicycle, instruction in its use, and any warranty questions.

Your new bike is to be delivered by a Authorized Cannondale Retailer to you in a completely assembled and properly adjusted condition, complete with all required safety equipment, Owner's Manuals, any Cannondale Owner's Manual Supplements, and the available manufacturer's instructions (shipped by Cannondale) for parts and components for your bike.

To find the Cannondale retailer closest to you, call 1-800-BIKE-USA, or use our website dealer locator at www.cannondale.com.

Use Only Genuine Replacement Parts

It is important to your safety and the performance of your Cannondale bicycle that you use only genuine Cannondale replacement parts in Headshok and Lefty forks, Cannondale swingarms and rear suspension assemblies, derailleur hangers and other frame hardware. These parts are described in Owners Manual Supplements. This note does not apply to widely used generic bicycle components such as derailleurs.

This manual meets EN standards 14764, 14766, and 14781.

PART I

CONTENTS

USE OF THIS MANUAL 1

PART I

GENERAL WARNING.....4

A SPECIAL NOTE FOR PARENTS.....4

SECTION 1. FIRST 5-8

1.A Bike Fit.....5
1.B Safety First.....5
1.C Mechanical Safety Check 6
1.D First Ride 8

SECTION 2. SAFETY..... 8-14

2.A The Basics.....9
2.B Riding Safety.....10
2.C Off-Road Safety.....11
2.D Wet Weather Riding 11
2.E Night Riding 12
2.F Extreme, Stunt, or Competition Riding 13
2.G Changing Components
Adding Accessories 14

SECTION 3. FIT 15-19

3.A Stand Over Height.....15
3.B Saddle Position 16
3.C. Handlebar Height and Angle.....18
3.D Control Position Adjustments.....19
3.E Brake Reach 19

SECTION 4. TECH ..... 20 - 37

4.A Wheels.....20
4.B Seat Post Cam Action Clamp.....26
4.C Brakes 27
4.D Shifting Gears.....30
4.E Pedals.....32
4.F Bicycle Suspension.....33
4.G Tires and Tubes 34

SECTION 5. SERVICE.....38-41

5.A Service Intervals 39
5.B If Your Bicycle Sustains an Impact 41

PART II

**SECTION A.
IMPORTANT SAFETY INFO 42-50**

A Wide Range of Injuries Are Possible 42
Bicycles Cannot Protect You 42
Bicycling Inherent Risk 42
Warning Label.....43
Riding in Traffic, Commuting.....43
Riding at Night, Dusk, Dawn 44
Refinishing 45
Modifications 45
Child Carriers.....46
Children and Stationary Bike Trainers.....45
Bicycles Have Sharp Surfaces.....46
Bar Ends 46
Installing Accessories.....46
Tire Size 47
Aerodynamic Handlebars.....47
About Shimmy 48
Toe Clip Overlap.....48
Brake Power Modulators.....49
Aftermarket Brake Systems.....49
Aftermarket Power Systems 50

SECTION B. INTENDED USE.....51-59

This section also includes weight limit information.

High Performance Road.....52
General Purpose Riding 53
Cross-Country, Marathon, Hardtails 54
All Mountain.....55
Gravity, Freeride, Downhill.....56
Dirt Jump.....57
Cyclocross 58
Road Tandems 58
Mountain Tandems.....59

SECTION C.
MOUNTAIN BIKE RIDING 60-63
Off-Road Riding 60
Bike Types 60
Inspection and Maintenance Routines 60
Suspension 61
Jumping 61
Stay In Control 61
Downhill and Lift-Serviced Riding 61
Shifting Gears While Pedaling 61
Freeride and Downhill Riding 64

SECTION D.
INSPECT FOR SAFETY 66-76

1. Understanding Metals 67

2. Understanding Composites (**Carbon Fiber**) 72
3. Understanding Components 74
Bicycle Lifespan 76
Useful Life of Lightweight Frames 76

SECTION E.
MAINTENANCE 77-81

30 Day Service 77
Cleaning 77
Preventing Corrosion 77
Lubrication 78
Tightening Torques 78
Repair/Work Stands 79
Protect From Extreme Temperatures 79
RIding Through Water 79
Applying Frame Protection 80

SECTION F.
CANNONDALE LIMITED WARRANTY 82
Warranty Registration 83
Serial Number 83

SECTION G.
PRE-RIDE CHECKLIST 95-96

CANNONDALE
AUTHORIZED DISTRIBUTORS 84

APPENDICES

APPENDIX A.
Cannondale BB30 Bicycle Frames 86

APPENDIX B.
Maximum Fork Length 87

APPENDIX C.
Carbon Fiber Seat Posts 88

APPENDIX D.
Carbon Fiber Forks and Stems 90

APPENDIX E.
Bicycle Racks 92

APPENDIX F.
Bicycle Trainers 94

PART I

GENERAL WARNING

Like any sport, bicycling involves risk of injury and damage. By choosing to ride a bicycle, you assume the responsibility for that risk, so you need to know — and to practice — the rules of safe and responsible riding and of proper use and maintenance. Proper use and maintenance of your bicycle reduces risk of injury.

This Manual contains many "Warnings" and "Cautions" concerning the consequences of failure to maintain or inspect your bicycle and of failure to follow safe cycling practices.

The combination of the safety alert symbol and the word **WARNING** indicates a potentially hazardous situation which, if not avoided, could result in serious injury or death.

The combination of the safety alert symbol and the word **CAUTION** indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury, or is an alert against unsafe practices.

The word CAUTION used without the safety alert symbol indicates a situation which, if not avoided, could result in serious damage to the bicycle or the voiding of your warranty.

Many of the Warnings and Cautions say "you may lose control and fall". Because any fall can result in serious injury or even death, we do not always repeat the warning of possible injury or death.

Because it is impossible to anticipate every situation or condition which can occur while riding, this Manual makes no representation about the safe use of the bicycle under all conditions. There are risks associated with the use of any bicycle which cannot be predicted or avoided, and which are the sole responsibility of the rider.

A SPECIAL NOTE FOR PARENTS

As a parent or guardian, you are responsible for the activities and safety of your minor child, and that includes making sure that the bicycle is properly fitted to the child; that it is in good repair and safe operating condition; that you and your child have learned and understand the safe operation of the bicycle; and that you and your child have learned, understand and obey not only the applicable local motor vehicle, bicycle and traffic laws, but also the common sense rules of safe and responsible bicycling. As a parent, you should read this manual, as well as review its warnings and the bicycle's functions and operating procedures with your child, before letting your child ride the bicycle.

WARNING

MAKE SURE THAT YOUR CHILD ALWAYS WEARS AN APPROVED BICYCLE HELMET WHEN RIDING; BUT ALSO MAKE SURE THAT YOUR CHILD UNDERSTANDS THAT A BICYCLE HELMET IS FOR BICYCLING ONLY, AND MUST BE REMOVED WHEN NOT RIDING.

A helmet must not be worn while playing, in play areas, on playground equipment, while climbing trees, or at any time while not riding a bicycle. Failure to follow this warning could result in serious injury or death.

SECTION 1. FIRST

NOTE: We strongly urge you to read this Manual in its entirety before your first ride. At the very least, read and make sure that you understand each point in this section, and refer to the cited sections on any issue which you don't completely understand. Please note that not all bicycles have all of the features described in this manual. Ask your dealer to point out the features of your bicycle.

1.A - BIKE FIT

1. Is your bike the right size? To check, see SECTION 3.A. If your bicycle is too large or too small for you, You may lose control and fall. If your new bike is not the right size, ask your dealer to exchange it before you ride it.
2. Is the saddle at the right height? To check, see SECTION 3.B. If you adjust your saddle height, follow the Minimum Insertion instructions in SECTION 3.B.
3. Are saddle and seat post securely clamped? A correctly tightened saddle will allow no saddle movement in any direction. See SECTION 3.B.
4. Are the stem and handlebars at the right height for you? If not, see SECTION 3.C.
5. Can you comfortably operate the brakes? If not, you may be able to adjust their angle and reach. See SECTION 3.D and 3.E.
6. Do you fully understand how to operate your new bicycle? If not, before your first ride, have your dealer explain any functions or features which you do not understand.

1.B - SAFETY FIRST

1. Always wear an approved helmet when riding your bike, and follow the helmet manufacturer's instructions for fit, use and care.
2. Do you have all the other required and recommended safety equipment? See SECTION 2. It's your responsibility to familiarize yourself with the laws of the areas where you ride, and to comply with all applicable laws.
3. Do you know how to correctly operate your wheel quick releases? Check SECTION 4.A.1 to make sure. Riding with an improperly adjusted wheel quick release can cause the wheel to wobble or disengage from the bicycle, and cause serious injury or death.
4. If your bike has toeclips and straps or clipless ("step-in") pedals, make sure you know how they work (see SECTION 4.E). These pedals require special techniques and skills. Follow the pedal manufacturer's instructions for use, adjustment and care.
5. Do you have "toe overlap"? On smaller framed bicycles your toe or toeclip may be able to contact the front wheel when a pedal is all the way forward and the wheel is turned. Read SECTION 4.E. If you have toeclip overlap.
6. Does your bike have suspension? If so, check SECTION 4.F. Suspension can change the way a bicycle performs. Follow the suspension manufacturer's instructions for use, adjustment and care.

1.C - MECHANICAL SAFETY CHECK

Routinely check the condition of your bicycle before every ride.

Nuts, Bolts Screws & Other Fasteners

Because manufacturers use a wide variety of fastener sizes and shapes made in a variety of materials, often differing by model and component, the correct tightening force or torque cannot be generalized.

To make sure that the many fasteners on your bicycle are correctly tightened. See page 78.

Always refer to the torque specifications in the instructions provided by the manufacturer of a component in question.

Correctly tightening a fastener requires a calibrated torque wrench. A professional bicycle mechanic with a torque wrench should torque the fasteners on you bicycle. If you choose to work on your own bicycle, you must use a torque wrench and the correct tightening torque specifications from the bicycle or component manufacturer or from your dealer. If you need to make an adjustment at home or in the field, we urge you to exercise care, and to have the fasteners you worked on checked by your dealer as soon as possible.

WARNING

CORRECT TIGHTENING FORCE ON FASTENERS –NUTS, BOLTS, SCREWS– ON YOUR BICYCLE IS IMPORTANT.

Too little force, and the fastener may not hold securely. Too much force, and the fastener can strip threads, stretch, deform or break. Either way, incorrect tightening force can result in component failure, which can cause you to loose control and fall.

Make sure nothing is loose. Lift the front wheel off the ground by two or three inches, then let it bounce on the ground. Anything sound, feel or look loose? Do a visual and tactile inspection of the whole bike. Any loose parts or accessories? If so, secure them. If you're not sure, ask someone with experience to check.

Tires & Wheels

Make sure tires are correctly inflated (see SECTION 4.G.1). Check by putting one hand on the saddle, one on the intersection of the handlebars and stem, then bouncing your weight on the bike while looking at tire deflection. Compare what you see with how it looks when you know the tires are correctly inflated; and adjust if necessary.

Tires in good shape? Spin each wheel slowly and look for cuts in the tread and sidewall. Replace damaged tires before riding the bike.

Wheels true? Spin each wheel and check for brake clearance and side-to-side wobble. If a wheel wobbles side-to-side even slightly, or rubs against or hits the brake pads, take the bike to a qualified bike shop to have the wheel trued.

CAUTION

Wheels must be true for the brakes to work effectively. Wheel trueing is a skill which requires special tools and experience. Do not attempt to true a wheel unless you have the knowledge, experience and tools needed to do the job correctly.

Wheel rims clean and undamaged? Make sure the rims are clean and undamaged at the tire bead and, if you have rim brakes, along the braking surface. Check to make sure that any rim wear indicator marking is not visible at any point on the wheel rim.

⚠ WARNING

BICYCLE WHEEL RIMS ARE SUBJECT TO WEAR.

Ask your dealer about wheel rim wear. Some wheel rims have a rim wear indicator which becomes visible as the rim's braking surface wears. A visible rim wear indicator on the side of the wheel rim is an indication that the wheel rim has reached its maximum usable life. Riding a wheel that is at the end of its usable life can result in wheel failure, which can cause you to loose control and fall.

Brakes

Check the brakes for proper operation (see SECTION 4.C). Squeeze the brake levers. Are the brake quick-releases closed? All control cables seated and securely engaged? Do the brake pads contact the wheel rim squarely and make full contact with the rim? Do the brake pads touch the wheel rim within an inch of brake lever movement? Can you apply full braking force at the levers without having them touch the handlebar? If not, your brakes need adjustment. Do not ride the bike until the brakes are properly adjusted by a professional bicycle mechanic.

Wheel Retention System

Make sure the front and rear wheels are correctly secured. See SECTION 4.A

Seat post

If your seat post has an over-center cam action fastener for easy height adjustment, check that it is properly adjusted and in the locked position. See Section 4.B.

Handlebar and Saddle Alignment

Make sure the saddle and handlebar stem are parallel to the bike's center line and clamped tight enough so that you can't twist them out of alignment. See SECTION 3.B and 3.C.

Handlebar Ends

Make sure the handlebar grips are secure and in good condition. If not, have your dealer replace them. Make sure the handlebar ends and extensions are plugged. If not, plug them before you ride. If the handlebars have bar end extensions, make sure they are clamped tight enough so you can't twist them.

⚠ WARNING

LOOSE OR DAMAGED HANDLEBAR GRIPS OR EXTENSIONS CAN CAUSE YOU TO LOSE CONTROL AND FALL. UNPLUGGED HANDLEBARS OR EXTENSIONS CAN CUT YOU AND CAUSE SERIOUS INJURY IN AN OTHERWISE MINOR ACCIDENT.

VERY IMPORTANT SAFETY NOTE:

Please also read and become thoroughly familiar with the important information on the lifespan of your bicycle and its components in PART II, SECTION D. INSPECT FOR SAFETY.

PART I

1.D - FIRST RIDE

When you buckle on your helmet and go for your first familiarization ride on your new bicycle, be sure to pick a controlled environment, away from cars, other cyclists, obstacles or other hazards. Ride to become familiar with the controls, features and performance of your new bike.

Familiarize yourself with the braking action of the bike (see SECTION 4.C). Test the brakes at slow speed, putting your weight toward the rear and gently applying the brakes, rear brake first. Sudden or excessive application of the front brake could pitch you over the handlebars. Applying brakes too hard can lock up a wheel, which could cause you to lose control and fall. Skidding is an example of what can happen when a wheel locks up.

If your bicycle has toeclips or clipless pedals, practice getting in and out of the pedals. See paragraph B.4 above and SECTION 4.E.4.

If your bike has suspension, familiarize yourself with how the suspension responds to brake application and rider weight shifts. See paragraph B.6 above and SECTION 4.F.

Practice shifting the gears (see SECTION 4.D). Remember to never move the shifter while pedaling backward, nor pedal backwards immediately after having moved the shifter. This could jam the chain and cause serious damage to the bicycle.

Check out the handling and response of the bike; and check the comfort.

If you have any questions, or if you feel anything about the bike is not as it should be, consult your dealer before you ride.

SECTION 2. SAFETY

⚠ WARNING

MANY STATES REQUIRE SPECIFIC SAFETY DEVICES. IT IS YOUR RESPONSIBILITY TO FAMILIARIZE YOURSELF WITH THE LAWS OF THE STATE WHERE YOU RIDE AND TO COMPLY WITH ALL APPLICABLE LAWS, INCLUDING PROPERLY EQUIPPING YOURSELF AND YOUR BIKE AS THE LAW REQUIRES.

Observe all local bicycle laws and regulations.

Observe regulations about bicycle lighting, licensing of bicycles, riding on sidewalks, laws regulating bike path and trail use, helmet laws, child carrier laws, special bicycle traffic laws.

It's your responsibility to know and obey the laws.

2.A - THE BASICS

1. Always wear a cycling helmet which meets the latest certification standards and is appropriate for the type of riding you do. Always follow the helmet manufacturer's instructions for fit, use and care of your helmet. Most serious bicycle injuries involve head injuries which might have been avoided if the rider had worn an appropriate helmet.

Figure 1. Bicycle Helmet

Your helmet should be:

- U.S. Consumer Product Safety Commission (CPSC) certified (look for the label on the helmet)
- Properly Sized for You
- Properly Fitted to You
- Properly Attached to Your Head!
- Undamaged

ASK YOUR RETAILER FOR HELP

⚠ WARNING

FAILURE TO WEAR A HELMET WHEN RIDING MAY RESULT IN SERIOUS INJURY OR DEATH.

2. Always do the Mechanical Safety Check (SECTION 1.C) before you get on a bike.
3. Be thoroughly familiar with the controls of your bicycle: brakes (SECTION 4.C.); pedals (SECTION 4.E.); shifting (SECTION 4.D.)
4. Be careful to keep body parts and other objects away from the sharp teeth of chainrings, the moving chain, the turning pedals and cranks, and the spinning wheels of your bicycle.
5. Always wear:

- Shoes that will stay on your feet and will grip the pedals. Never ride barefoot or in sandals.
- Bright, visible clothing that is not so loose that it can be tangled in the bicycle or snagged by objects at the side of the road or trail.
- Protective eye wear, to protect against airborne dirt, dust and bugs —tinted when the sun is bright, clear when it's not.

6. Don't jump with your bike. Jumping a bike, particularly a BMX or mountain bike, can be fun; but it can put huge and unpredictable stress on the bicycle and its components. Riders who insist on jumping their bikes risk serious damage, to their bicycles as well as to themselves. Before you attempt to jump, do stunt riding or race with your bike, read and understand SECTION 2.F.
7. Ride at a speed appropriate for conditions. Increased speed means higher risk.

2.B - RIDING SAFETY

Obey all rules of the road and all local traffic laws.

1. You are sharing the road or the path with others — motorists, pedestrians and other cyclists. Respect their rights.
2. Ride defensively. Always assume that others do not see you.
3. Look ahead, and be ready to avoid:

- Vehicles slowing or turning, entering the road or your lane ahead of you, or coming up behind you.
- Parked car doors opening.
- Pedestrians stepping out.
- Children or pets playing near the road.
- Pot holes, sewer grating, railroad tracks, expansion joints, road or sidewalk construction, debris and other obstructions that could cause you to swerve into traffic, catch your wheel or otherwise cause you to lose control and have an accident.
- The many other hazards and distractions which can occur on a bicycle ride.

4. Ride in designated bike lanes, on designated bike paths or as close to the edge of the road as possible, in the direction of traffic flow or as directed by local governing laws.
5. Stop at stop signs and traffic lights; slow down and look both ways at street intersections. Remember that a bicycle always loses in a collision with a motor vehicle, so be prepared to yield even if you have the right of way.
6. Use approved hand signals for turning and stopping.
7. Never ride with headphones. They mask traffic sounds and emergency vehicle sirens, distract you from concentrating on what's going on around you, and their wires can tangle in the moving parts of the bicycle, causing you to lose control.
8. Never carry a passenger, unless it is a small child wearing an approved helmet and secured in a correctly mounted child carrier or a child-carrying trailer.
9. Never carry anything which obstructs your vision or your complete control of the bicycle, or which could become entangled in the moving parts of the bicycle.
10. Never hitch a ride by holding on to another vehicle.
11. Don't do stunts, wheelies or jumps. If you intend to do stunts, wheelies, jumps or go racing with your bike despite our advice not to, read SECTION 2.F, Downhill, Stunt or Competition Biking, now. Think carefully about your skills before deciding to take the large risks that go with this kind of riding.
12. Don't weave through traffic or make any moves that may surprise people with whom you are sharing the road.
13. Observe and yield the right of way.
14. Never ride your bicycle while under the influence of alcohol or drugs.
15. If possible, avoid riding in bad weather, when visibility is obscured, at dawn, dusk or in the dark, or when extremely tired. Each of these conditions increases the risk of accident.

2.C - OFF-ROAD SAFETY

We recommend that children not ride on rough terrain unless they are accompanied by an adult.

1. The variable conditions and hazards of off-road riding require close attention and specific skills. Start slowly on easier terrain and build up your skills. If your bike has suspension, the increased speed you may develop also increases your risk of losing control and falling. Get to know how to handle your bike safely before trying increased speed or more difficult terrain.
2. Wear safety gear appropriate to the kind of riding you plan to do.
3. Don't ride alone in remote areas. Even when riding with others, make sure that someone knows where you're going and when you expect to be back.
4. Always take along some kind of identification, so that people know who you are in case of an accident; and take along a couple of dollars in cash for a candy bar, a cool drink or an emergency phone call.
5. Yield right of way to pedestrians and animals. Ride in a way that does not frighten or endanger them, and give them enough room so that their unexpected moves don't endanger you.
6. Be prepared. If something goes wrong while you're riding off-road, help may not be close.
7. Before you attempt to jump, do stunt riding or race with your bike, read and understand SECTION 2.F.

Off-Road Respect

Obey the local laws regulating where and how you can ride off-road, and respect private property. You may be sharing the trail with others — hikers, equestrians, other cyclists. Respect their rights. Stay on the designated trail. Don't contribute to erosion by riding in mud or with unnecessary sliding. Don't disturb the ecosystem by cutting your own trail or shortcut through vegetation or streams. It is your responsibility to minimize your impact on the environment. Leave things as you found them; and always take out everything you brought in.

2.D - WET WEATHER RIDING

Under wet conditions, the stopping power of your brakes (as well as the brakes of other vehicles sharing the road) is dramatically reduced and your tires don't grip nearly as well. This makes it harder to control speed and easier to lose control.

⚠ WARNING

WET WEATHER IMPAIRS TRACTION, BRAKING AND VISIBILITY, BOTH FOR THE BICYCLIST AND FOR OTHER VEHICLES SHARING THE ROAD.

The risk of an accident is dramatically increased in wet conditions.

To make sure that you can slow down and stop safely in wet conditions, ride more slowly and apply your brakes earlier and more gradually than you would under normal, dry conditions. See also SECTION 4.C.

2.E - NIGHT RIDING

Riding a bicycle at night is many times more dangerous than riding during the day. A bicyclist is very difficult for motorists and pedestrians to see. Therefore, children should never ride at dawn, at dusk or at night. Adults who chose to accept the greatly increased risk of riding at dawn, at dusk or at night need to take extra care both riding and choosing specialized equipment which helps reduce that risk. Consult your dealer about night riding safety equipment.

⚠ WARNING

REFLECTORS ARE NOT A SUBSTITUTE FOR REQUIRED LIGHTS. RIDING AT DAWN, AT DUSK, AT NIGHT OR AT OTHER TIMES OF POOR VISIBILITY WITHOUT AN ADEQUATE BICYCLE LIGHTING SYSTEM AND WITHOUT REFLECTORS IS DANGEROUS AND MAY RESULT IN SERIOUS INJURY OR DEATH.

Bicycle reflectors are designed to pick up and reflect street lights and car lights in a way that may help you to be seen and recognized as a moving bicyclist.

⚠ CAUTION

Check reflectors and their mounting brackets regularly to make sure that they are clean, straight, unbroken and securely mounted. Have your dealer replace damaged reflectors and straighten or tighten any that are bent or loose.

The mounting brackets of front and rear reflectors are often designed as brake straddle cable safety catches which prevent the straddle cable from catching on the tire tread if the cable jumps out of its yoke or breaks.

⚠ WARNING

DO NOT REMOVE THE FRONT OR REAR REFLECTORS OR REFLECTOR BRACKETS FROM YOUR BICYCLE. They are an integral part of the bicycle's safety system.

REMOVING THE REFLECTORS MAY REDUCE YOUR VISIBILITY TO OTHERS USING THE ROADWAY. BEING STRUCK BY OTHER VEHICLES MAY RESULT IN SERIOUS INJURY OR DEATH.

The reflector brackets may protect you from the brake straddle cable catching on the tire in the event of brake cable failure. If a brake straddle cable catches on the tire, it can cause the wheel to stop suddenly, causing you to loose control and fall.

If you choose to ride under conditions of poor visibility, check and be sure you comply with all local laws about night riding, and take the following strongly recommended additional precautions:

- Purchase and install battery or generator powered head and tail lights which meet all regulatory requirements and provide adequate visibility.
- Wear light colored, reflective clothing and accessories, such as a reflective vest, reflective arm and leg bands, reflective stripes on your helmet, flashing lights attached to your body and/or your bicycle ... any reflective device or light source that moves will help you get the attention of approaching motorists, pedestrians and other traffic.
- Make sure your clothing or anything you may be carrying on the bicycle does not obstruct a reflector or light.
- Make sure that your bicycle is equipped with correctly positioned and securely mounted reflectors.

WHILE RIDING AT DAWN, AT DUSK OR AT NIGHT:

- Ride slowly.
- Avoid dark areas, areas of heavy or fast-moving traffic.
- Avoid road hazards.
- If possible, ride on familiar routes.

IF RIDING IN TRAFFIC :

- Be predictable. Ride so that drivers can see you and predict your movements.
- Be alert. Ride defensively and expect the unexpected.
- If you plan to ride in traffic often, ask your dealer about traffic safety classes or a good book on bicycle traffic safety.

2.F - EXTREME, STUNT OR COMPETITION RIDING

Whether you call it Aggro, Hucking, Freeride, North Shore, Downhill, Jumping, Stunt Riding, Racing or something else: if you engage in this sort of extreme, aggressive riding you ***will*** get hurt, and you voluntarily assume a greatly increased risk of injury or death.

Not all bicycles are designed for these types of riding, and those that are may not be suitable for all types of aggressive riding. Check with your dealer or the bicycle's manufacturer about the suitability of your bicycle before engaging in extreme riding.

When riding fast down hill, you can reach speeds achieved by motorcycles, and therefore face similar hazards and risks. Have your bicycle and equipment carefully inspected by a qualified mechanic and be sure it is in perfect condition. Consult with expert riders and race officials on conditions and equipment advisable at the site where you plan to ride. Wear appropriate safety gear, including an approved full face helmet, full finger gloves, and body armor. Ultimately, it is your responsibility to have proper equipment and to be familiar with course conditions.

⚠ WARNING

ALTHOUGH MANY CATALOGS, ADVERTISEMENTS AND ARTICLES ABOUT BICYCLING DEPICT RIDERS ENGAGED IN EXTREME RIDING, THIS ACTIVITY IS EXTREMELY DANGEROUS, INCREASES YOUR RISK OF INJURY OR DEATH, AND INCREASES THE SEVERITY OF ANY INJURY.

Remember that the action depicted is being performed by professionals with many years of training and experience. Know your limits and always wear a helmet and other appropriate safety gear. Even with state-of-the-art protective safety gear, you could be seriously injured or killed when jumping, stunt riding, riding downhill at speed or in competition.

⚠ WARNING

Bicycles and bicycle parts have limitations with regard to strength and integrity, and this type of riding can exceed those limitations.

We recommend against this type of riding because of the increased risks; but if you choose to take the risk, at least:

- Take lessons from a competent instructor first
- Start with easy learning exercises and slowly develop your skills before trying more difficult or dangerous riding
- Use only designated areas for stunts, jumping, racing or fast downhill riding
- Wear a full face helmet, safety pads and other safety gear
- Understand and recognize that the stresses imposed on your bike by this kind of activity may break or damage parts of the bicycle and void the warranty
- Take your bicycle to your dealer if anything breaks or bends. Do not ride your bicycle when any part is damaged.

If you ride downhill at speed, do stunt riding or ride in competition, know the limits of your skill and experience. Ultimately, avoiding injury is your responsibility.

2.G - CHANGING COMPONENTS OR ADDING ACCESSORIES

There are many components and accessories available to enhance the comfort, performance and appearance of your bicycle. However, if you change components or add accessories, you do so at your own risk. The bicycle's manufacturer may not have tested that component or accessory for compatibility, reliability or safety on your bicycle.

Before installing any component or accessory, including a different size tire, make sure that it is compatible with your bicycle by checking with your dealer. Be sure to read, understand and follow the instructions that accompany the products you purchase for your bicycle. **See also PART II, SECTION D. INSPECT FOR SAFETY.**

⚠ WARNING

FAILURE TO CONFIRM COMPATIBILITY, PROPERLY INSTALL, OPERATE AND MAINTAIN ANY COMPONENT OR ACCESSORY CAN RESULT IN SERIOUS INJURY OR DEATH.

⚠ WARNING

Changing the components on your bike may void the warranty. Refer to your warranty, and check with your dealer before changing the components on your bike.

SECTION 3. FIT

NOTE: Correct fit is an essential element of bicycling safety, performance and comfort. Making the adjustments to your bicycle which result in correct fit for your body and riding conditions requires experience, skill and special tools. Always have your dealer make the adjustments on your bicycle; or, if you have the experience, skill and tools, have your dealer check your work before riding.

⚠ WARNING

IF YOUR BICYCLE DOES NOT FIT PROPERLY, YOU MAY LOSE CONTROL AND FALL.

If your new bike doesn't fit, ask your dealer to exchange it before you ride it.

3.A - STAND OVER HEIGHT

Stand over height is the basic element of bike fit (see fig. 2). It is the distance from the ground to the top of the bicycle's frame at that point where your crotch is when straddling the bike. To check for correct stand over height, straddle the bike while wearing the kind of shoes in which you'll be riding, and bounce vigorously on your heels. If your crotch touches the frame, the bike is too big for you. Don't even ride the bike around the block. A bike which you ride only on paved surfaces and never take off-road should give you a minimum stand over height clearance of two inches (5 cm). A bike that you'll ride on unpaved surfaces should give you a minimum of three inches (7.5 cm) of stand over height clearance. And a bike that you'll use off road should give you four inches (10 cm) or more of clearance.

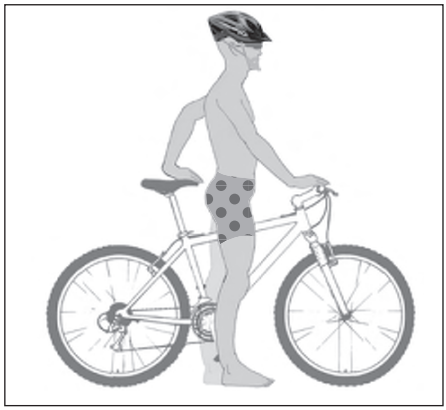


Figure 2. Stand Over Height

⚠ WARNING

IF YOU PLAN TO USE YOUR BIKE FOR JUMPING OR STUNT RIDING, READ SECTION 2.F AGAIN.

2. Step-through frame bicycles

Standover height does not apply to bicycles with step-through frames. Instead, the limiting dimension is determined by saddle height range. You must be able to adjust your saddle position as described in 3.B. SADDLE POSITION without exceeding the limits set by the height of the top of the seat tube and the "Minimum Insertion" or "Maximum Extension" mark on the seat post.

3.B - SADDLE POSITION

Correct saddle adjustment is an important factor in getting the most performance and comfort from your bicycle. If the saddle position is not comfortable for you, see your dealer.

The saddle can be adjusted in three directions:

1. Up and Down Adjustment

To check for correct saddle height (fig. 3):

• Sit on the saddle;

• Place one heel on a pedal;

• Rotate the crank until the pedal with your heel on it is in the down position and the crank arm is parallel to the seat tube.

If your leg is not completely straight, your saddle height needs to be adjusted. If your hips must rock for the heel to reach the pedal, the saddle is too high. If your leg is bent at the knee with your heel on the pedal, the saddle is too low.

Figure 3. Saddle Position

Ask your dealer to set the saddle for your optimal riding position and to show you how to make this adjustment. If you choose to make your own saddle height adjustment:

- loosen the seat post clamp
- raise or lower the seat post in the seat tube
- make sure the saddle is straight fore and aft
- re-tighten the seat post clamp to the recommended torque (See manufacturer's instructions).

Once the saddle is at the correct height, make sure that the seat post does not project from the frame beyond its "Minimum Insertion" or "Maximum Extension" mark (fig. 4).

NOTE: Some bicycles have a sight hole in the seat tube, the purpose of which is to make it easy to see whether the seat post is inserted in the seat tube far enough to be safe. If your bicycle has such a sight hole, use it instead of the "Minimum Insertion" or "Maximum Extension" mark to make sure the seat post is inserted in the seat tube far enough to be visible through the sight hole.

If your bike has an interrupted seat tube, as is the case on some suspension bikes, you must also make sure that the seat post is far enough into the frame so that you can touch it through the bottom of the interrupted seat tube with the tip of your finger without inserting your finger beyond its first knuckle. Also see NOTE above and fig. 5).

⚠ WARNING

If your seat post is not inserted in the seat tube as described in B.1 above, the seat post may break, which could cause you to lose control and fall.

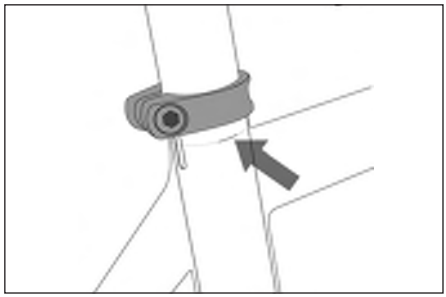


Figure 4. Minimum Insertion Mark

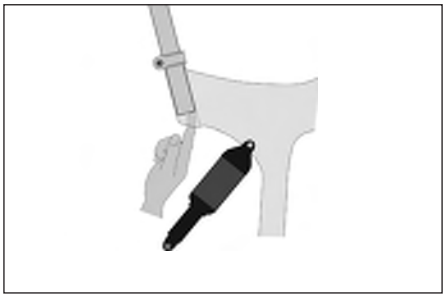


Figure 5. Interrupted Seat Tube

2. Front and Back Adjustment

The saddle can be adjusted forward or back to help you get the optimal position on the bike. Ask your dealer to set the saddle for your optimal riding position and to show you how to make this adjustment.

If you choose to make your own front and back adjustment, make sure that the clamp mechanism is clamping on the straight part of the saddle rails and is not touching the curved part of the rails, and that you are using the recommended torque on the clamping fastener(s) (See manufacturer's instructions).

3. Saddle Angle Adjustment

Most people prefer a horizontal saddle; but some riders like the saddle nose angled up or down just a little. Your dealer can adjust saddle angle or teach you how to do it.

If you choose to make your own saddle angle adjustment and you have a single bolt saddle clamp on your seat post, it is critical that you loosen the clamp bolt sufficiently to allow any serrations on the mechanism to disengage before changing the saddle's angle, and then that the serrations fully re-engage before you tighten the clamp bolt to the recommended torque (See manufacturer's instructions).

NOTE: *If your bicycle is equipped with a suspension seat post, periodically ask your dealer to check it.*

Small changes in saddle position can have a substantial effect on performance and comfort. To find your best saddle position, make only one adjustment at a time.

⚠ WARNING

When making saddle angle adjustments with a single bolt saddle clamp, always check to make sure that the serrations on the mating surfaces of the clamp are not worn. Worn serrations on the clamp can allow the saddle to move, causing you to lose control and fall.

Always tighten fasteners to the correct torque. Bolts that are too tight can stretch and deform. Bolts that are too loose can move and fatigue. Either mistake can lead to a sudden failure of the bolt, causing you to lose control and fall.

⚠ WARNING

After any saddle adjustment, be sure that the saddle adjusting mechanism is properly tightened before riding. A loose saddle clamp or seat post binder can cause damage to the seat post, or can cause you to lose control and fall.

A correctly tightened saddle adjusting mechanism will allow no saddle movement in any direction. Periodically check to make sure that the saddle adjusting mechanism is properly tightened.

If, in spite of carefully adjusting the saddle height, tilt and fore-and-aft position, your saddle is still uncomfortable, you may need a different saddle design. Saddles, like people, come in many different shapes, sizes and resilience. Your dealer can help you select a saddle which, when correctly adjusted for your body and riding style, will be comfortable.

⚠ WARNING

Some people have claimed that extended riding with a saddle which is incorrectly adjusted or which does not support your pelvic area correctly can cause short-term or long-term injury to nerves and blood vessels, or even impotence.

If your saddle causes you pain, numbness or other discomfort, listen to your body and stop riding until you see your dealer about saddle adjustment or a different saddle.

3.C - HANDLEBAR HEIGHT AND ANGLE

Your bike is equipped either with a "threadless" stem, which clamps on to the outside of the steerer tube, or with a "quill" stem, which clamps inside the steerer tube by way of an expanding binder bolt. If you aren't absolutely sure which type of stem your bike has, ask your dealer.

If your bike has a "threadless" stem, your dealer may be able to change handlebar height by moving height adjustment spacers from below the stem to above the stem, or vice versa. Otherwise, you'll have to get a stem of different length or rise. Consult your dealer. Do not attempt to do this yourself, as it requires special knowledge.

If your bike has a "quill" stem, you can ask your dealer to adjust the handlebar height a bit by adjusting stem height.

A quill stem has an etched or stamped mark on its shaft which designates the stem's "Minimum Insertion" or "Maximum Extension". This mark must not be visible above the headset.

FIGURE 6

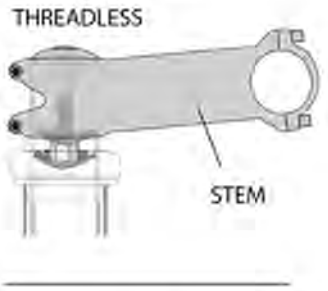
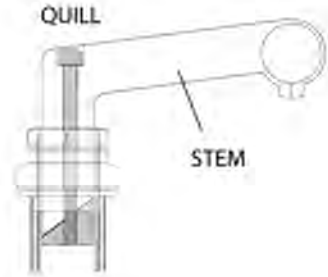


FIGURE 7



⚠ WARNING

QUILL STEMS: THE STEM'S MINIMUM INSERTION MARK MUST NOT BE VISIBLE ABOVE THE TOP OF THE HEADSET.

If the stem is extended beyond the minimum insertion mark the stem may break or damage the fork's steerer tube, which could cause you to lose control and fall.

⚠ WARNING

On some bicycles, changing the stem or stem height can affect the tension of the front brake cable, locking the front brake or creating excess cable slack which can make the front brake inoperable. If the front brake pads move in towards the wheel rim or out away from the wheel rim when the stem or stem height is changed, the brakes must be correctly adjusted before you ride the bicycle.

Some bicycles are equipped with an adjustable angle stem. If your bicycle has an adjustable angle stem, ask your dealer to show you how to adjust if. Do not attempt to make the adjustment yourself, as changing stem angle may also require adjustments to the bicycle's controls.

⚠ WARNING

Always tighten fasteners to the correct torque. Bolts that are too tight can stretch and deform. Bolts that are too loose can move and fatigue. Either mistake can lead to a sudden failure of the bolt, causing you to lose control and fall.

⚠ WARNING

AN INSUFFICIENTLY TIGHTENED STEM BINDER BOLT, HANDLEBAR BINDER BOLT OR BAR END EXTENSION CLAMPING BOLT MAY COMPROMISE STEERING ACTION, WHICH COULD CAUSE YOU TO LOSE CONTROL AND FALL.

Place the front wheel of the bicycle between your legs and attempt to twist the handlebar/stem assembly. If you can twist the stem in relation to the front wheel, turn the handlebars in relation to the stem, or turn the bar end extensions in relation to the handlebar, the bolts are insufficiently tightened.

Your dealer can also change the angle of the handlebar or bar end extensions.

3.D - CONTROL POSITION ADJUSTMENTS

The angle of the brake and shift control levers and their position on the handlebars can be changed. Ask your dealer to make the adjustments for you.

If you choose to make your own control lever angle adjustment, be sure to re-tighten the clamp fasteners to the recommended torque (See manufacturer's instructions).

3.E - BRAKE REACH

Many bikes have brake levers which can be adjusted for reach. If you have small hands or find it difficult to squeeze the brake levers, your dealer can either adjust the reach or fit shorter reach brake levers.

⚠ WARNING

THE SHORTER THE BRAKE LEVER REACH, THE MORE CRITICAL IT IS TO HAVE CORRECTLY ADJUSTED BRAKES, SO THAT FULL BRAKING POWER CAN BE APPLIED WITHIN AVAILABLE BRAKE LEVER TRAVEL.

Brake lever travel insufficient to apply full braking power can result in loss of control, which may result in serious injury or death.

PART I

SECTION 4. TECH

It's important to your safety, performance and enjoyment to understand how things work on your bicycle.

We urge you to ask your dealer how to do the things described in this section before you attempt them yourself, and that you have your dealer check your work before you ride the bike.

If you have even the slightest doubt as to whether you understand something in this section of the Manual, talk to your dealer.

4.A - WHEELS

Bicycle wheels are designed to be removable for easier transportation and for repair of a tire puncture. In most cases, the wheel axles are inserted into slots, called "dropouts" in the fork and frame, but some suspension mountain bikes use what is called a "through axle" wheel mounting system.

If you have a mountain bike equipped with through axle front or rear wheels, make sure that your dealer has given you the manufacturer's instructions, and follow those when installing or removing a through axle wheel. If you don't know what a through axle is, ask your dealer.

Wheels are secured in one of three ways:

• A hollow axle with a shaft ("skewer") running through it which has an adjustable tension nut on one end and an over-center cam on the other (cam action system, fig.8a & 8b).

• A hollow axle with a shaft ("skewer") running through it which has a nut on one end and a fitting for a hex key, lock lever or other tightening device on the other (through bolt, fig. 9)

• Hex nuts or hex key bolts which are threaded on to or into the hub axle (bolt-on wheel, fig. 10)

⚠ WARNING

RIDING WITH AN IMPROPERLY SECURED WHEEL CAN ALLOW THE WHEEL TO WOBBLE OR FALL OFF THE BICYCLE, WHICH CAN CAUSE SERIOUS INJURY OR DEATH. THEREFORE, IT IS ESSENTIAL THAT YOU:

1. Ask your dealer to help you make sure you know how to install and remove your wheels safely.
2. Understand and apply the correct technique for clamping your wheel in place.
3. Each time, before you ride the bike, check that the wheel is securely clamped.

The clamping action of a correctly secured wheel must emboss the surfaces of the dropouts.

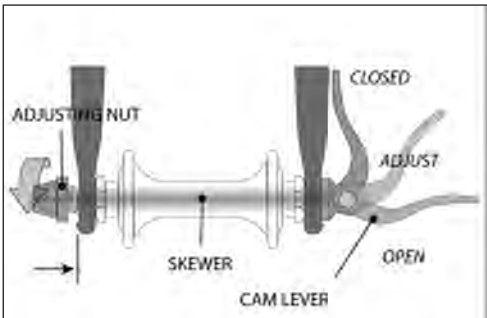


FIGURE 8a

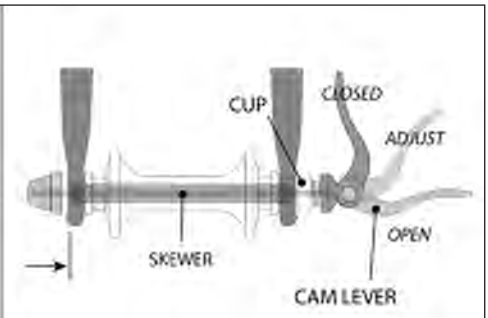


FIGURE 8b

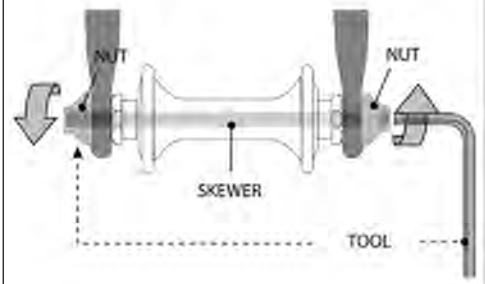


FIGURE 9

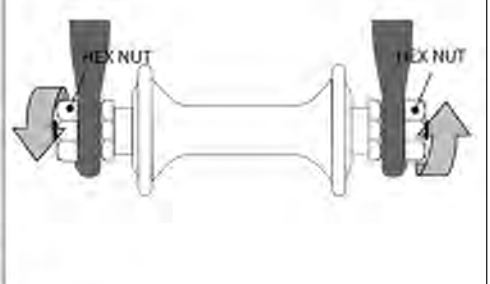


FIGURE 10

Your bicycle may be equipped with a different securing method for the front wheel than for the rear wheel. Discuss the wheel securing method for your bicycle with your dealer.

It is very important that you understand the type of wheel securing method on your bicycle, that you know how to secure the wheels correctly, and that you know how to apply the correct clamping force that safely secures the wheel.

Ask your dealer to instruct you in correct wheel removal and installation, and ask for the manufacturer's instructions.

PART I

1. Front Wheel Secondary Retention Devices

Most bicycles have front forks which utilize a secondary wheel retention device to reduce the risk of the wheel disengaging from the fork if the wheel is incorrectly secured. Secondary retention devices are not a substitute for correctly securing your front wheel.

Secondary retention devices fall into two basic categories:

a. The clip-on type is a part which the manufacturer adds to the front wheel hub or front fork.

b. The integral type is molded, cast or machined into the outer faces of the front fork dropouts.

Ask your dealer to explain the particular secondary retention device on your bike.

⚠ WARNING

DO NOT REMOVE OR DISABLE THE SECONDARY RETENTION DEVICE.

As its name implies, it serves as a back-up for a critical adjustment. If the wheel is not secured correctly, the secondary retention device can reduce the risk of the wheel disengaging from the fork. Removing or disabling the secondary retention device may also void the warranty.

Secondary retention devices are not a substitute for correctly securing your wheel. Failure to properly secure the wheel can cause the wheel to wobble or disengage, which could cause you to loose control and fall, resulting in serious injury or death.

2. Wheels With Cam Action Systems

There are currently two types of over-center cam wheel retention mechanisms: the traditional over-center cam (fig. 8a) and the cam-and-cup system (fig. 8b). Both use an over-center cam action to clamp the bike's wheel in place. Your bicycle may have a cam-and-cup front wheel retention system and a traditional rear wheel cam action system.

A. Adjusting The Traditional Cam Action Mechanism (Fig. 8a)

The wheel hub is clamped in place by the force of the over-center cam pushing against one dropout and pulling the tension adjusting nut, by way of the skewer, against the other dropout. The amount of clamping force is controlled by the tension adjusting nut. Turning the tension adjusting nut clockwise while keeping the cam lever from rotating increases clamping force; turning it counterclockwise while keeping the cam lever from rotating reduces clamping force. Less than half a turn of the tension adjusting nut can make the difference between safe clamping force and unsafe clamping force.

⚠ WARNING

THE FULL FORCE OF THE CAM ACTION IS NEEDED TO CLAMP THE WHEEL SECURELY.

Holding the nut with one hand and turning the lever like a wing nut with the other hand until everything is as tight as you can get it will not clamp a cam action wheel safely in the dropouts.

See also WARNING on page 20.

B. Adjusting The Cam-and-cup Mechanism (Fig. 8b)

The cam-and-cup system on your front wheel will have been correctly adjusted for your bicycle by your dealer. Ask your dealer to check the adjustment every six months. Do not use a cam-and-cup front wheel on any bicycle other than the one for which your dealer adjusted it.

3. Removing And Installing Wheels

⚠ WARNING

IF YOUR BIKE IS EQUIPPED WITH A HUB BRAKE SUCH AS A REAR COASTER BRAKE, FRONT OR REAR DRUM, BAND OR ROLLER BRAKE; OR IF IT HAS AN INTERNAL GEAR REAR HUB, DO NOT ATTEMPT TO REMOVE THE WHEEL.

The removal and re-installation of most hub brakes and internal gear hubs requires special knowledge. Incorrect removal or assembly can result in brake or gear failure, which can cause you to lose control and fall.

⚠ CAUTION

If your bike has a disc brake, exercise care in touching the rotor or caliper. Disc rotors have sharp edges, and both rotor and caliper can get very hot during use.

A. Removing A Disk Brake Or Rim Brake Front Wheel

(1) If your bike has rim brakes, disengage the brake's quick-release mechanism to increase the clearance between the tire and the brake pads (See Section 4.C fig. 11 through 15).

(2) If your bike has cam action front wheel retention, move the cam lever from the locked or CLOSED position to the OPEN position (figs. 8a & b). If your bike has through bolt or bolt-on front wheel retention, loosen the fastener(s) a few turns counter-clockwise using an appropriate wrench, lock key or the integral lever.

(3) If your front fork has a clip-on type secondary retention device, disengage it and go to step (4). If your front fork has an integral secondary retention device, and a traditional cam action system (fig. 8a) loosen the tension adjusting nut enough to allow removing the wheel from the dropouts. If your front wheel uses a cam-and-cup system, (fig. 8b) squeeze the cup and cam lever together while removing the wheel. No rotation of any part is necessary with the cam-and-cup system.

You may need to tap the top of the wheel with the palm of your hand to release the wheel from the front fork.

B. Installing A Disk Brake Or Rim Brake Front Wheel

⚠ CAUTION

If your bike is equipped with a front disk brake, be careful not to damage the disk, caliper or brake pads when re-inserting the disk into the caliper. Never activate a disk brake's control lever unless the disk is correctly inserted in the caliper. See also Section 4.C.

(1) If your bike has cam action front wheel retention, move the cam lever so that it curves away from the wheel (fig. 8b). This is the OPEN position. If your bike has through bolt or bolt-on front wheel retention, go to the next step.

(2) With the steering fork facing forward, insert the wheel between the fork blades so that the axle seats firmly at the top of the fork dropouts. The cam lever, if there is one, should be on rider's left side of the bicycle (fig. 8a & b). If your bike has a clip-on type secondary retention device, engage it.

(3) If you have a traditional cam action mechanism: holding the cam lever in the ADJUST position with your right hand, tighten the tension adjusting nut with your left hand until it is finger tight against the fork dropout (fig. 8a). If you have a cam-and-cup system: the nut and cup (fig. 8b) will have snapped into the recessed area of the fork dropouts and no adjustment should be required.

(4) While pushing the wheel firmly to the top of the slots in the fork dropouts, and at the same time centering the wheel rim in the fork:

(a) With a cam action system, move the cam lever upwards and swing it into the CLOSED position (fig. 8a & b). The lever should now be parallel to the fork blade and curved toward the wheel. To apply enough clamping force, you should have to wrap your fingers around the fork blade for leverage, and the lever should leave a clear imprint in the palm of your hand.

(b) With a through-bolt or bolt-on system, tighten the fasteners to the torque specifications in Appendix D or the hub manufacturer's instructions.

NOTE: If, on a traditional cam action system, the lever cannot be pushed all the way to a position parallel to the fork blade, return the lever to the OPEN position. Then turn the tension adjusting nut counterclockwise one-quarter turn and try tightening the lever again.

(6) With a through-bolt or bolt-on system, tighten the fasteners to the torque specifications in Appendix D or the hub manufacturer's instructions.

⚠ WARNING

SECURELY CLAMPING THE WHEEL WITH A CAM ACTION RETENTION DEVICE TAKES CONSIDERABLE FORCE.

If you can fully close the cam lever without wrapping your fingers around the fork blade for leverage, the lever does not leave a clear imprint in the palm of your hand, and the serrations on the wheel fastener do not emboss the surfaces of the dropouts, the tension is insufficient. Open the lever; turn the tension adjusting nut clockwise a quarter turn; then try again.

See also WARNING on page 20.

(6) If you disengaged the brake quick-release mechanism in 3. a. (1) above, re-engage it to restore correct brake pad-to-rim clearance.

(7) Spin the wheel to make sure that it is centered in the frame and clears the brake pads; then squeeze the brake lever and make sure that the brakes are operating correctly.

C. Removing A Disk Brake Or Rim Brake Rear Wheel

(1) If you have a multi-speed bike with a derailleur gear system: shift the rear derailleur to high gear (the smallest, outermost rear sprocket).

If you have an internal gear rear hub, consult your dealer or the hub manufacturer's instructions before attempting to remove the rear wheel.

If you have a single-speed bike with rim or disk brake, go to step (4) below.

(2) If your bike has rim brakes, disengage the brake's quick-release mechanism to increase the clearance between the wheel rim and the brake pads (see Section 4.C, figs. 11 through 15).

(3) On a derailleur gear system, pull the derailleur body back with your right hand.

(4) With a cam action mechanism, move the quick-release lever to the OPEN position (fig. 8b). With a through bolt or bolt on mechanism, loosen the fastener(s) with an appropriate wrench, lock lever or integral lever; then push the wheel forward far enough to be able to remove the chain from the rear sprocket.

(5) Lift the rear wheel off the ground a few inches and remove it from the rear dropouts.

D. Installing A Disk Brake Or Rim Brake Rear Wheel

⚠ CAUTION

If your bike is equipped with a rear disk brake, be careful not to damage the disk, caliper or brake pads when re-inserting the disk into the caliper. Never activate a disk brake's control lever unless the disk is correctly inserted in the caliper.

(1) With a cam action system, move the cam lever to the OPEN position (see fig. 8 a & b). The lever should be on the side of the wheel opposite the derailleur and freewheel sprockets.

(2) On a derailleur bike, make sure that the rear derailleur is still in its outermost, high gear, position; then pull the derailleur body back with your right hand. Put the chain on top of the smallest freewheel sprocket.

(3) On single-speed, remove the chain from the front sprocket, so that you have plenty of slack in the chain. Put the chain on the rear wheel sprocket.

(4) Then, insert the wheel into the frame dropouts and pull it all the way in to the dropouts.

(5) On a single speed or an internal gear hub, replace the chain on the chainring; pull the wheel back in the dropouts so that it is straight in the frame and the chain has about 1/4 inches of up-and-down play.

(6) With a cam action system, move the cam lever upwards and swing it into the CLOSED position (fig. 8 a & b). The lever should now be parallel to the seat stay or chain stay and curved toward the wheel. To apply enough clamping force, you should have to wrap your fingers around the seat stay or chainstay for leverage, and the lever should leave a clear imprint in the palm of your hand.

(7) With a through-bolt or bolt-on system, tighten the fasteners to the torque specifications in Appendix D or the hub manufacturer's instructions.

NOTE: If, on a traditional cam action system, the lever cannot be pushed all the way to a position parallel to the seat stay or chain stay, return the lever to the OPEN position. Then turn the tension adjusting nut counterclockwise one-quarter turn and try tightening the lever again.

⚠ WARNING

SECURELY CLAMPING THE WHEEL WITH A CAM ACTION RETENTION DEVICE TAKES CONSIDERABLE FORCE.

If you can fully close the cam lever without wrapping your fingers around the seat stay or chain stay for leverage, the lever does not leave a clear imprint in the palm of your hand, and the serrations on the wheel fastener do not emboss the surfaces of the dropouts, the tension is insufficient. Open the lever; turn the tension adjusting nut clockwise a quarter turn; then try again.

See also WARNING on page 20.

(8) If you disengaged the brake quick-release mechanism in 3. c. (2) above, re-engage it to restore correct brake pad-to-rim clearance.

(9) Spin the wheel to make sure that it is centered in the frame and clears the brake pads; then squeeze the brake lever and make sure that the brakes are operating correctly.

4.B. SEAT POST CAM ACTION CLAMP

Some bikes are equipped with a cam action seat post binder. The seat post cam action binder works exactly like the traditional wheel cam action fastener (Section 4.A.2) While a cam action binder looks like a long bolt with a lever on one end and a nut on the other, the binder uses an over-center cam action to firmly clamp the seat post (see fig. 8a).

WARNING

Riding with an improperly tightened seat post can allow the saddle to turn or move and cause you to lose control and fall. Therefore:

1. Ask your dealer to help you make sure you know how to correctly clamp your seat post.

2. Understand and apply the correct technique for clamping your seat post.

3. Before you ride the bike, first check that the seat post is securely clamped.

Adjusting The Seat Post Cam Action Mechanism

The action of the cam squeezes the seat collar around the seat post to hold the seat post securely in place. The amount of clamping force is controlled by the tension adjusting nut. Turning the tension adjusting nut clockwise while keeping the cam lever from rotating increases clamping force; turning it counterclockwise while keeping the cam lever from rotating reduces clamping force. Less than half a turn of the tension adjusting nut can make the difference between safe and unsafe clamping force.

WARNING

THE FULL FORCE OF THE CAM ACTION IS NEEDED TO CLAMP THE SEAT POST SECURELY.

Holding the nut with one hand and turning the lever like a wing nut with the other hand until everything is as tight as you can get it will not clamp the seat post safely.

WARNING

If you can fully close the cam lever without wrapping your fingers around the seat post or a frame tube for leverage, and the lever does not leave a clear imprint in the palm of your hand, the tension is insufficient. Open the lever; turn the tension adjusting nut clockwise a quarter turn; then try again.

4.C - BRAKES

There are three general types of bicycle brakes: rim brakes, which operate by squeezing the wheel rim between two brake pads; disc brakes, which operate by squeezing a hub-mounted disc between two brake pads; and internal hub brakes. All three can be operated by way of a handlebar mounted lever. On some models of bicycle, the internal hub brake is operated by pedaling backwards. This is called a Coaster Brake and is described on page 30.

⚠ WARNING

1. **Riding with improperly adjusted brakes or worn brake pads is dangerous and can result in serious injury or death.**

2. **Applying brakes too hard or too suddenly can lock up a wheel, which could cause you to lose control and fall.** Sudden or excessive application of the front brake may pitch the rider over the handlebars, which may result in serious injury or death.

3. **Some bicycle brakes, such as disc brakes (fig. 11) And linear-pull brakes (fig.12), Are extremely powerful.** Take extra care in becoming familiar with these brakes and exercise particular care when using them.

4. **Some bicycle brakes are equipped with a brake force modulator, a small, cylindrical device through which the brake control cable runs and which is designed to provide a more progressive application of braking force.** A modulator makes the initial brake lever force more gentle, progressively increasing force until full force is achieved. If your bike is equipped with a brake force modulator, take extra care in becoming familiar with its performance characteristics.

5. **Disc brakes can get extremely hot with extended use. Be careful not to touch a disc brake until it has had plenty of time to cool.**

6. **See the brake manufacturer's instructions for installation, operation and care of your brakes.** If you do not have the manufacturer's instructions, see your dealer or contact the brake manufacturer.

1. Brake Controls And Features

It's very important to your safety that you learn and remember which brake lever controls which brake on your bike.

For example:

In the US and Europe, The rear brake is controlled by the right-hand brake lever; the front brake is controlled by the left-hand lever.

In the United Kingdom and Japan, the rear brake is controlled by the left lever; the front brake is controlled by the right lever.

Confirm with your dealer how your bike is set up.

Make sure that your hands can reach and squeeze the brake levers comfortably. If your hands are too small to operate the levers comfortably, consult your dealer before riding the bike. The lever reach may be adjustable; or you may need a different brake lever design.

Most brakes have some form of quick-release mechanism to allow the brake pads to clear the tire when a wheel is removed or reinstalled. When the brake quick release is in the open position, the brakes are inoperative. Ask your dealer to make sure that you understand the way the brake quick release works on your bike (see figs. 11, 12, 13, 14 & 15) and check each time to make sure both brakes work correctly before you get on the bike.

2. How Brakes Work

The braking action of a bicycle is a function of the friction between the brake surfaces — usually the brake pads and the wheel rim. To make sure that you have maximum friction available, keep your wheel rims and brake pads clean and free of dirt, lubricants, waxes or polishes.

Brakes are designed to control your speed, not just to stop the bike. Maximum braking force for each wheel occurs at the point just before the wheel "locks up" (stops rotating) and starts to skid. Once the tire skids, you actually lose most of your stopping force and all directional control. You need to practice slowing and stopping smoothly without locking up a wheel. The technique is called progressive brake modulation. Instead of jerking the brake lever to the position where you think you'll generate appropriate braking force, squeeze the lever, progressively increasing the braking force. If you feel the wheel begin to lock up, release pressure just a little to keep the wheel rotating just short of lockup.

It's important to develop a feel for the amount of brake lever pressure required for each wheel at different speeds and on different surfaces. To better understand this, experiment a little by walking your bike and applying different amounts of pressure to each brake lever, until the wheel locks.

When you apply one or both brakes, the bike begins to slow, but your body wants to continue at the speed at which it was going. This causes a transfer of weight to the front wheel (or, under heavy braking, around the front wheel hub, which could send you flying over the handlebars).

A wheel with more weight on it will accept greater brake pressure before lockup; a wheel with less weight will lock up with less brake pressure. So, as you apply brakes and your weight is transferred forward, you need to shift your body toward the rear of the bike, to transfer weight back on to the rear wheel; and at the same time, you need to both decrease rear braking and increase front braking force. This is even more important on descents, because descents shift weight forward.

Two keys to effective speed control and safe stopping are controlling wheel lockup and weight transfer. This weight transfer is even more pronounced if your bike has a front suspension fork. Front suspension "dips" under braking, increasing the weight transfer (see also SECTION 4.F). Practice braking and weight transfer techniques where there is no traffic or other hazards and distractions.

Everything changes when you ride on loose surfaces or in wet weather. Tire adhesion is reduced, so the wheels have less cornering and braking traction and can lock up with less brake force. Moisture or dirt on the brake pads reduces their ability to grip. The way to maintain control on loose or wet surfaces is to go more slowly.

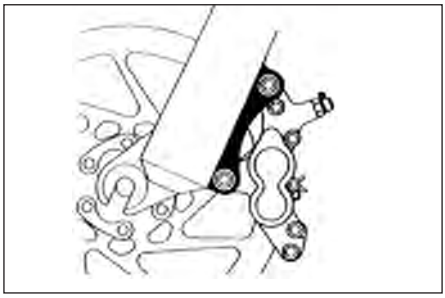


Figure 11.

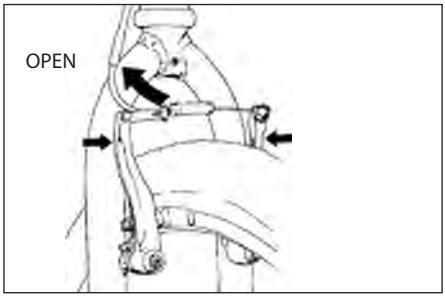


Figure 12.

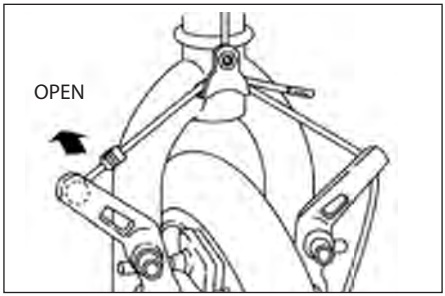


Figure 13.

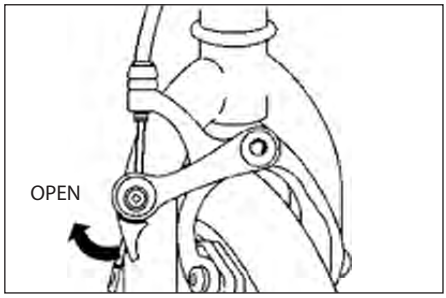


Figure 14.

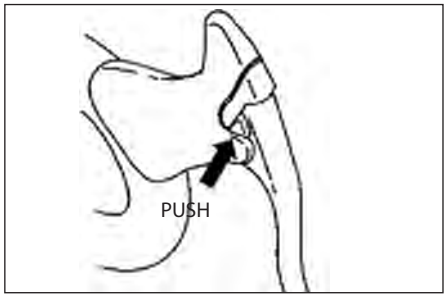
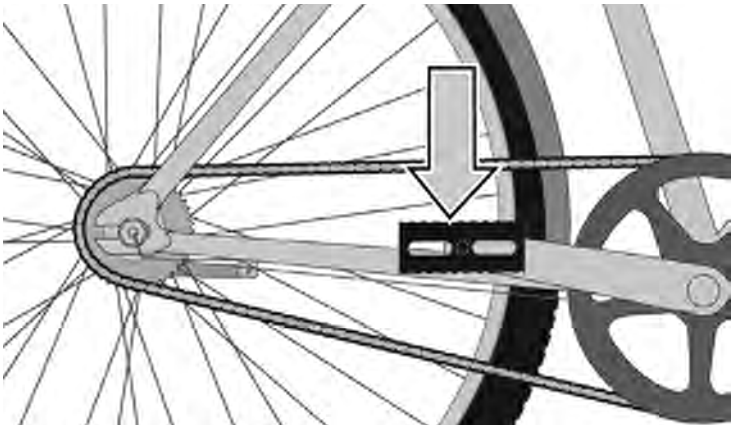


Figure 15.

PART I

COASTER BRAKES



1. How the coaster brake works

The coaster brake is a sealed mechanism which is a part of the bicycle's rear wheel hub. The brake is activated by reversing the rotation of the pedal cranks (indicated by arrow above). Start with the pedal cranks in a nearly horizontal position, with the front pedal in about the 4 o'clock position, and apply downward foot pressure on the pedal that is to the rear. About 1/8 turn rotation will activate the brake. The more downward pressure you apply, the more braking force, up to the point where the rear wheel stops rotating and begins to skid.

⚠ WARNING

Before riding, make sure that the brake is working properly. If it is not working properly, have the bicycle checked by your dealer before you ride it.

⚠ WARNING

If your bike has only a coaster brake, ride conservatively. A single rear brake does not have the stopping power of front-and-rear brake systems.

2. Adjusting your coaster brake

Coaster brake service and adjustment requires special tools and special knowledge. Do not attempt to disassemble or service your coaster brake. Take the bicycle to your dealer for coaster brake service.

4.D - SHIFTING GEARS

Your multi-speed bicycle will have a derailleur drivetrain (see 1. below), an internal gear hub drivetrain (see 2. below) or, in some special cases, a combination of the two.

1. **How a derailleur drivetrain works If your bicycle has a derailleur drivetrain, the gear-changing mechanism will have:**

- a rear cassette or freewheel sprocket cluster
- a rear derailleur
- usually a front derailleur
- one or two shifters
- one, two or three front sprockets called chainrings
- a drive chain

a. Shifting Gears

There are several different types and styles of shifting controls: levers, twist grips, triggers, combination shift/brake controls, push-buttons, and so on. Ask your dealer to explain the type of shifting controls that are on your bike, and to show you how they work.

The vocabulary of shifting can be pretty confusing. A downshift is a shift to a "lower" or "slower" gear, one which is easier to pedal. An upshift is a shift to a "higher" or "faster", harder to pedal gear. What's confusing is that what's happening at the front derailleur is the opposite of what's happening at the rear derailleur (for details, read the instructions on Shifting the Rear Derailleur and Shifting the Front Derailleur below).

For example, you can select a gear which will make pedaling easier on a hill (make a downshift) in one of two ways: shift the chain down the gear "steps" to a smaller gear at the front, or up the gear "steps" to a larger gear at the rear. So, at the rear gear cluster, what is called a downshift looks like an upshift. The way to keep things straight is to remember that shifting the chain in towards the centerline of the bike is for accelerating and climbing and is called a downshift. Moving the chain out or away from the centerline of the bike is for speed and is called an upshift.

Whether upshifting or downshifting, the bicycle derailleur system design requires that the drive chain be moving forward and be under at least some tension. A derailleur will shift only if you are pedaling forward.

⚠ CAUTION

Never move the shifter while pedaling backward, nor pedal backwards immediately after having moved the shifter. This could jam the chain and cause serious damage to the bicycle.

b. Shifting the Rear Derailleur

The rear derailleur is controlled by the right shifter.

The function of the rear derailleur is to move the drive chain from one gear sprocket to another. The smaller sprockets on the gear cluster produce higher gear ratios. Pedaling in the higher gears requires greater pedaling effort, but takes you a greater distance with each revolution of the pedal cranks. The larger sprockets produce lower gear ratios. Using them requires less pedaling effort, but takes you a shorter distance with each pedal crank revolution. Moving the chain from a smaller sprocket of the gear cluster to a larger sprocket results in a downshift. Moving the chain from a larger sprocket to a smaller sprocket results in an upshift. In order for the derailleur to move the chain from one sprocket to another, the rider must be pedaling forward.

c. Shifting the Front Derailleur:

The front derailleur, which is controlled by the left shifter, shifts the chain between the larger and smaller chainrings. Shifting the chain onto a smaller chainring makes pedaling easier (a downshift). Shifting to a larger chainring makes pedaling harder (an upshift).

d. Which gear should I be in?

The combination of largest rear and smallest front gears (fig. 16) is for the steepest hills. The smallest rear and largest front combination is for the greatest speed. It is not necessary to shift gears in sequence. Instead, find the "starting gear" which is right for your level of ability — a gear which is hard enough for quick acceleration but easy enough to let you start from a stop without wobbling — and experiment with upshifting and downshifting to get a feel for the different gear combinations. At first, practice shifting where there are no obstacles, hazards or other traffic, until you've built up your confidence. Learn to anticipate the need to shift, and shift to a lower gear before the hill gets too steep. If you have difficulties with shifting, the problem could be mechanical adjustment. See your dealer for help.

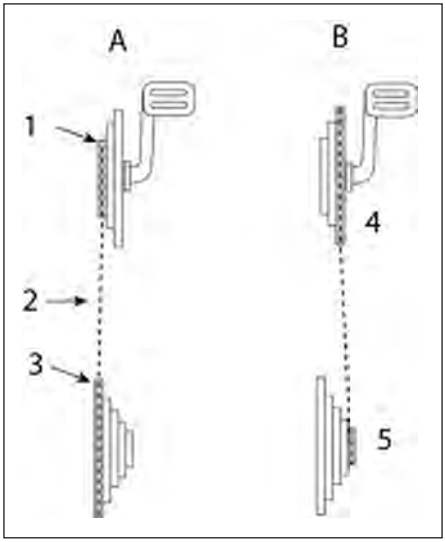


Figure 16.

A. Hills

B. Greatest Speed

1. Smallest front

2. Chain

3. Largest rear

4. Largest front

5. Smallest rear

⚠ WARNING

NEVER SHIFT A DERAILLEUR ONTO THE LARGEST OR THE SMALLEST SPROCKET IF THE DERAILLEUR IS NOT SHIFTING SMOOTHLY.

The derailleur may be out of adjustment and the chain could jam, causing you to lose control and fall.

e. What if it won't shift gears?

If moving the shift control one click repeatedly fails to result in a smooth shift to the next gear chances are that the mechanism is out of adjustment. Take the bike to your dealer to have it adjusted.

2. How an internal gear hub drivetrain works

If your bicycle has an internal gear hub drivetrain, the gear changing mechanism will consist of:

- a 3, 5, 7, 8, 12 speed or possibly an infinitely variable internal gear hub
- one, or sometimes two shifters
- one or two control cables
- one front sprocket called a chainring
- a drive chain

a. Shifting internal gear hub gears

Shifting with an internal gear hub drivetrain is simply a matter of moving the shifter to the indicated position for the desired gear. After you have moved the shifter to the gear position of your choice, ease the pressure on the pedals for an instant to allow the hub to complete the shift.

b. Which gear should I be in?

The numerically lowest gear (1) is for the steepest hills. The numerically largest gear is for the greatest speed.

Shifting from an easier, "slower" gear (like 1) to a harder, "faster" gear (like 2 or 3) is called an upshift. Shifting from a harder, "faster" gear to an easier, "slower" gear is called a downshift. It is not necessary to shift gears in sequence. Instead, find the "starting gear" for the conditions — a gear which is hard enough for quick acceleration but easy enough to let you start from a stop without wobbling — and experiment with upshifting and downshifting to get a feel for the different gears. At first, practice shifting where there are no obstacles, hazards or other traffic, until you've built up your confidence. Learn to anticipate the need to shift, and shift to a lower gear before the hill gets too steep. If you have difficulties with shifting, the problem could be mechanical adjustment. See your dealer for help.

c. What if it won't shift gears?

If moving the shift control one click repeatedly fails to result in a smooth shift to the next gear chances are that the mechanism is out of adjustment. Take the bike to your dealer to have it adjusted.

4.E - PEDALS

1. Toe Overlap is when your toe can touch the front wheel when you turn the handlebars to steer while a pedal is in the forwardmost position. This is common on small-framed bicycles, and is avoided by keeping the inside pedal up and the outside pedal down when making sharp turns. This technique will also prevent the inside pedal from striking the ground in a turn.

⚠ WARNING

TOE OVERLAP COULD CAUSE YOU TO LOSE CONTROL AND FALL. ASK YOUR DEALER TO HELP YOU DETERMINE IF THE COMBINATION OF FRAME SIZE, CRANK ARM LENGTH, PEDAL DESIGN AND SHOES YOU WILL USE RESULTS IN PEDAL OVERLAP.

Whether you have overlap or not, you must keep the inside pedal up and the outside pedal down when making sharp turns.

2. Some bicycles come equipped with pedals that have sharp and potentially dangerous surfaces. These surfaces are designed to add safety by increasing grip between the rider's shoe and the pedal. If your bicycle has this type of high-performance pedal, you must take extra care to avoid serious injury from the pedals' sharp surfaces. Based on your riding style or skill level, you may prefer a less aggressive pedal design, or chose to ride with shin pads. Your dealer can show you a number of options and make suitable recommendations.
3. Toeclips and straps are a means to keep feet correctly positioned and engaged with the pedals. The toeclip positions the ball of the foot over the pedal spindle, which gives maximum pedaling power. The toe strap, when tightened, keeps the foot engaged throughout the rotation cycle of the pedal. While toeclips and straps give some benefit with any kind of shoe, they work most effectively with cycling shoes designed for use with toeclips. Your dealer can explain how toeclips and straps work. Shoes with deep treaded soles or welts which might allow the foot to be trapped should not be used with toeclips and straps.

⚠ WARNING

GETTING INTO AND OUT OF PEDALS WITH TOECLIPS AND STRAPS REQUIRES SKILL WHICH CAN ONLY BE ACQUIRED WITH PRACTICE.

Until it becomes a reflex action, the technique requires concentration which can distract your attention and cause you to lose control and fall.

Practice the use of toeclips and straps where there are no obstacles, hazards or traffic. Keep the straps loose, and don't tighten them until your technique and confidence in getting in and out of the pedals warrants it. Never ride in traffic with your toe straps tight.

4. Clipless pedals (sometimes called "step-in pedals") are another means to keep feet securely in the correct position for maximum pedaling efficiency. They have a plate, called a "cleat," on the sole of the shoe, which clicks into a mating spring-loaded fixture on the pedal.

They only engage or disengage with a very specific motion which must be practiced until it becomes instinctive. Clipless pedals require shoes and cleats which are compatible with the make and model pedal being used.

Many clipless pedals are designed to allow the rider to adjust the amount of force needed to engage or disengage the foot. Follow the pedal manufacturer's instructions, or ask your dealer to show you how to make this adjustment. Use the easiest setting until engaging and disengaging becomes a reflex action, but always make sure that there is sufficient tension to prevent unintended release of your foot from the pedal.

WARNING

CLIPLESS PEDALS ARE INTENDED FOR USE WITH SHOES SPECIFICALLY MADE TO FIT THEM AND ARE DESIGNED TO FIRMLY KEEP THE FOOT ENGAGED WITH THE PEDAL.

DO NOT USE SHOES WHICH DO NOT ENGAGE THE PEDALS CORRECTLY.

Practice is required to learn to engage and disengage the foot safely. Until engaging and disengaging the foot becomes a reflex action, the technique requires concentration which can distract your attention and cause you to lose control and fall. Practice engaging and disengaging clipless pedals in a place where there are no obstacles, hazards or traffic; and be sure to follow the pedal manufacturer's setup and service instructions. If you do not have the manufacturer's instructions, see your dealer or contact the manufacturer.

4.F - BICYCLE SUSPENSION

Many bicycles are equipped with suspension systems. There are many different types of suspension systems — too many to deal with individually in this Manual. If your bicycle has a suspension system of any kind, be sure to read and follow the suspension manufacturer's setup and service instructions. If you do not have the manufacturer's instructions, see your dealer or contact the manufacturer.

WARNING

FAILURE TO MAINTAIN, CHECK AND PROPERLY ADJUST THE SUSPENSION SYSTEM MAY RESULT IN SUSPENSION MALFUNCTION, WHICH MAY CAUSE YOU TO LOSE CONTROL AND FALL.

If your bike has suspension, the increased speed you may develop also increases your risk of injury. For example, when braking, the front of a suspended bike dips. You could lose control and fall if you do not have experience with this system. Learn to handle your suspension system safely. See also SECTION 4.C.

WARNING

CHANGING SUSPENSION ADJUSTMENT CAN CHANGE THE HANDLING AND BRAKING CHARACTERISTICS OF YOUR BICYCLE.

Never change suspension adjustment unless you are thoroughly familiar with the suspension system manufacturer's instructions and recommendations, and always check for changes in the handling and braking characteristics of the bicycle after a suspension adjustment by taking a careful test ride in a hazard-free area.

Suspension can increase control and comfort by allowing the wheels to better follow the terrain. This enhanced capability may allow you to ride faster; but you must not confuse the enhanced capabilities of the bicycle with your own capabilities as a rider. Increasing your skill will take time and practice. Proceed carefully until you have learned to handle the full capabilities of your bike.

⚠ CAUTION

Not all bicycles can be safely retrofitted with some types of suspension systems. Before retrofitting a bicycle with any suspension, check with the bicycle's manufacturer to make sure that what you want to do is compatible with the bicycle's design. Failing to do so can result in catastrophic frame failure.

4.G TIRES AND TUBES

1. Tires

Bicycle tires are available in many designs and specifications, ranging from general-purpose designs to tires designed to perform best under very specific weather or terrain conditions. If, once you've gained experience with your new bike, you feel that a different tire might better suit your riding needs, your dealer can help you select the most appropriate design.

The size, pressure rating, and on some high-performance tires the specific recommended use, are marked on the sidewall of the tire (see fig. 17). The part of this information which is most important to you is Tire Pressure.

⚠ WARNING

NEVER INFLATE A TIRE BEYOND THE MAXIMUM PRESSURE MARKED ON THE TIRE'S SIDEWALL.

Exceeding the recommended maximum pressure may blow the tire off the rim, which could cause damage to the bike and injury to the rider and bystanders.

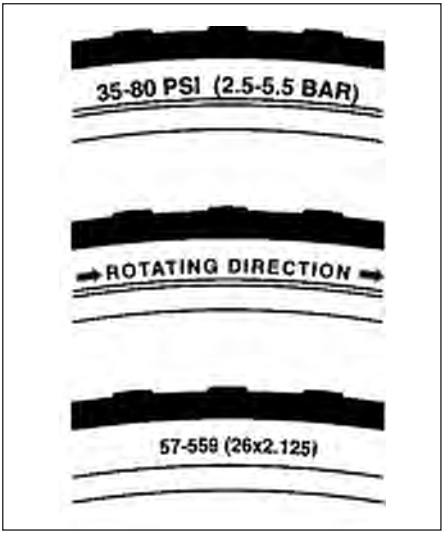


Figure 17.

The best and safest way to inflate a bicycle tire to the correct pressure is with a bicycle pump which has a built-in pressure gauge.

⚠ WARNING

THERE IS A SAFETY RISK IN USING GAS STATION AIR HOSES OR OTHER AIR COMPRESSORS.

They are not made for bicycle tires. They move a large volume of air very rapidly, and will raise the pressure in your tire very rapidly, which could cause the tube to explode.

Tire pressure is given either as maximum pressure or as a pressure range. How a tire performs under different terrain or weather conditions depends largely on tire pressure. Inflating the tire to near its maximum recommended pressure gives the lowest rolling resistance; but also produces the harshest ride. High pressures work best on smooth, dry pavement.

Very low pressures, at the bottom of the recommended pressure range, give the best performance on smooth, slick terrain such as hard-packed clay, and on deep, loose surfaces such as deep, dry sand.

Tire pressure that is too low for your weight and the riding conditions can cause a puncture of the tube by allowing the tire to deform sufficiently to pinch the inner tube between the rim and the riding surface.

⚠ CAUTION

Pencil type automotive tire gauges can be inaccurate and should not be relied upon for consistent, accurate pressure readings. Instead, use a high quality dial gauge.

Ask your dealer to recommend the best tire pressure for the kind of riding you will most often do, and have the dealer inflate your tires to that pressure. Then, check inflation as described in SECTION 1.C so you'll know how correctly inflated tires should look and feel when you don't have access to a gauge. Some tires may need to be brought up to pressure every week or two. So, it is important to check your tire pressures before every ride.

Some special high-performance tires have unidirectional treads: their tread pattern is designed to work better in one direction than in the other. The sidewall marking of a unidirectional tire will have an arrow showing the correct rotation direction. If your bike has unidirectional tires, be sure that they are mounted to rotate in the correct direction.

2. Tire Valves

There are primarily two kinds of bicycle tube valves: The Schrader Valve and the Presta Valve. The bicycle pump you use must have the fitting appropriate to the valve stems on your bicycle.

The Schrader valve (fig. 18) is like the valve on a car tire. To inflate a Schrader valve tube, remove the valve cap and clamp the pump fitting onto the end of the valve stem. To let air out of a Schrader valve, depress the pin in the end of the valve stem with the end of a key or other appropriate object.

The Presta valve (fig. 18) has a narrower diameter and is only found on bicycle tires. To inflate a Presta valve tube using a Presta headed bicycle pump, remove the valve cap; unscrew (counterclockwise) the valve stem lock nut; and push down on the valve stem to free it up. Then push the pump head on to the valve head, and inflate. To inflate a Presta valve with a Schrader pump fitting, you'll need a Presta adapter (available at your bike shop) which screws on to the valve stem once you've freed up the valve. The adapter fits into the Schrader pump fitting. Close the valve after inflation. To let air out of a Presta valve, open up the valve stem lock nut and depress the valve stem.

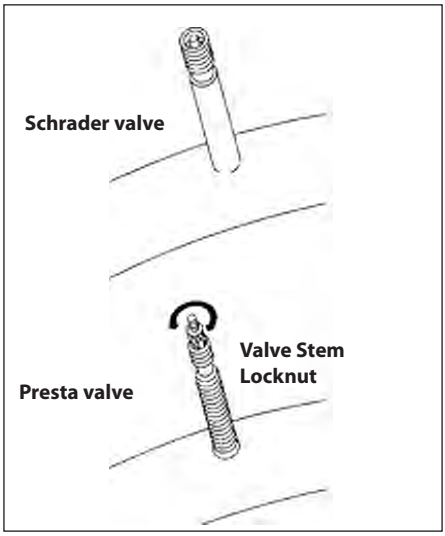


Figure 18.

⚠ WARNING

We highly recommend that you carry a spare inner tube when you ride your bike.

PATCHING A TUBE IS AN EMERGENCY REPAIR.

If you do not apply the patch correctly or apply several patches, the tube can fail, resulting in possible tube failure, which could cause you to loose control and fall. Replace a patched tube as soon as possible.

SECTION 5. SERVICE

WARNING

TECHNOLOGICAL ADVANCES HAVE MADE BICYCLES AND BICYCLE COMPONENTS MORE COMPLEX, AND THE PACE OF INNOVATION IS INCREASING.

IT IS IMPOSSIBLE FOR THIS MANUAL TO PROVIDE ALL THE INFORMATION REQUIRED TO PROPERLY REPAIR AND/OR MAINTAIN YOUR BICYCLE.

In order to help minimize the chances of an accident and possible injury, it is critical that you have any repair or maintenance which is not specifically described in this manual performed by your dealer. Equally important is that your individual maintenance requirements will be determined by everything from your riding style to geographic location.

Consult your dealer for help in determining your maintenance requirements.

WARNING

MANY BICYCLE SERVICE AND REPAIR TASKS REQUIRE SPECIAL KNOWLEDGE AND TOOLS.

Do not begin any adjustments or service on your bicycle until you have learned from your dealer how to properly complete them. Improper adjustment or service may result in damage to the bicycle or in an accident which can cause serious injury or death.

If you want to learn to do major service and repair work on your bike, you have three options:

1. Ask your dealer for copies of the manufacturer's installation and service instructions for the components on your bike, or contact the component manufacturer.
2. Ask your dealer to recommend a book on bicycle repair.
3. Ask your dealer about the availability of bicycle repair courses in your area.

We recommend that you ask your dealer to check the quality of your work the first time you work on something and before you ride the bike, just to make sure that you did everything correctly. Since that will require the time of a mechanic, there may be a modest charge for this service.

We also recommend that you ask your dealer for guidance on what spare parts, such as inner tubes, light bulbs, etc. it would be appropriate for you to have once you have learned how to replace such parts when they require replacement.

5.A - SERVICE INTERVALS

Some service and maintenance can and should be performed by the owner, and require no special tools or knowledge beyond what is presented in this manual.

The following are examples of the type of service you should perform yourself. All other service, maintenance and repair should be performed in a properly equipped facility by a qualified bicycle mechanic using the correct tools and procedures specified by the manufacturer.

1. **BREAK-IN PERIOD:** Your bike will last longer and work better if you break it in before riding it hard. Control cables and wheel spokes may stretch or "seat" when a new bike is first used and may require readjustment by your dealer. Your Mechanical Safety Check (SECTION 1.C) will help you identify some things that need readjustment. But even if everything seems fine to you, it's best to take your bike back to the dealer for a checkup. Dealers typically suggest you bring the bike in for a 30 day checkup. Another way to judge when it's time for the first checkup is to bring the bike in after three to five hours of hard off-road use, or about 10 to 15 hours of on-road or more casual off-road use. But if you think something is wrong with the bike, take it to your dealer before riding it again.
2. **BEFORE EVERY RIDE:** Mechanical Safety Check (SECTION 1.C)
3. **AFTER EVERY LONG OR HARD RIDE:** If the bike has been exposed to water or grit; or at least every 100 miles: Clean the bike and lightly oil the chain. Wipe off excess oil. Lubrication is a function of climate. Talk to your dealer about the best lubricants and the recommended lubrication frequency for your area.
4. **AFTER EVERY LONG OR HARD RIDE OR AFTER EVERY 10 TO 20 HOURS OF RIDING:**

- Squeeze the front brake and rock the bike forward and back. Everything feel solid? If you feel a clunk with each forward or backward movement of the bike, you probably have a loose headset. Have your dealer check it.
- Lift the front wheel off the ground and swing it from side to side. Feel smooth? If you feel any binding or roughness in the steering, you may have a tight headset. Have your dealer check it.
- Grab one pedal and rock it toward and away from the center line of the bike; then do the same with the other pedal. Anything feel loose? If so, have your dealer check it.
- Take a look at the brake pads. Starting to look worn or not hitting the wheel rim squarely? Time to have the dealer adjust or replace them.
- Carefully check the control cables and cable housings. Any rust? Kinks? Fraying? If so, have your dealer replace them.
- Squeeze each adjoining pair of spokes on either side of each wheel between your thumb and index finger. Do they all feel about the same? If any feel loose, have your dealer check the wheel for tension and trueness.
- Check to make sure that all parts and accessories are still secure, and tighten any which are not.

- Check the frame, particularly in the area around all tube joints; the handlebars; the stem; and the seatpost for any deep scratches, cracks or discoloration. These are signs of stress-caused fatigue and indicate that a part is at the end of its useful life and needs to be replaced. **See also PART II, SECTION D. INSPECT FOR SAFETY.**

5. **AS REQUIRED:** If either brake lever fails the Mechanical Safety Check (SECTION 1.C), don't ride the bike. Have your dealer check the brakes. If the chain won't shift smoothly and quietly from gear to gear, the derailleur is out of adjustment. See your dealer.
6. **EVERY 25 (HARD OFF-ROAD) TO 50 (ON-ROAD) HOURS OF RIDING:** Take your bike to your dealer for a complete checkup.

⚠ WARNING

LIKE ANY MECHANICAL DEVICE, A BICYCLE AND ITS COMPONENTS ARE SUBJECT TO WEAR AND STRESS. DIFFERENT MATERIALS AND MECHANISMS WEAR OR FATIGUE FROM STRESS AT DIFFERENT RATES AND HAVE DIFFERENT LIFE CYCLES.

IF A COMPONENT'S LIFE CYCLE IS EXCEEDED, THE COMPONENT CAN SUDDENLY AND CATASTROPHICALLY FAIL, CAUSING SERIOUS INJURY OR DEATH TO THE RIDER.

Scratches, cracks, fraying and discoloration are signs of stress-caused fatigue and indicate that a part is at the end of its useful life and needs to be replaced. While the materials and workmanship of your bicycle or of individual components may be covered by a warranty for a specified period of time by the manufacturer, this is no guarantee that the product will last the term of the warranty.

Product life is often related to the kind of riding you do and to the treatment to which you submit the bicycle. The bicycle's warranty is not meant to suggest that the bicycle cannot be broken or will last forever. It only means that the bicycle is covered subject to the terms of the warranty.

Please be sure to read PART II, SECTION D. INSPECT FOR SAFETY, "The Lifespan of Your Bicycle and Its Components."

5.B - If Your Bicycle Sustains An Impact:

First, check yourself for injuries, and take care of them as best you can. Seek medical help if necessary.

Next, check your bike for damage, and fix what you can so you can get home. Then, take your bicycle to your dealer for a thorough check.

Carbon composite components, including fames, wheels, handlebars, stems, cranksets, brakes, etc. which have sustained an impact must not be ridden until they have been disassembled and thoroughly inspected by a qualified mechanic.

See also Bicycle Lifespan on page 76.

⚠ WARNING

A CRASH OR OTHER IMPACT CAN PUT EXTRAORDINARY STRESS ON BICYCLE COMPONENTS, CAUSING THEM TO FATIGUE PREMATURELY. COMPONENTS SUFFERING FROM STRESS FATIGUE CAN FAIL SUDDENLY AND CATASTROPHICALLY, CAUSING LOSS OF CONTROL, SERIOUS INJURY OR DEATH.

PART II

SECTION A. IMPORTANT SAFETY INFORMATION

A Wide Range Of Bicycling Injuries Are Possible

Many hazards are described, and we have attempted to explain how to avoid or minimize the dangers. Because any fall can result in serious injury, paralysis or death we do not repeat the warning of these potential consequences every time we call attention to a hazard. Some low speed falls may result in serious injuries, and some wild high speed falls may result in none. The reality is that the exact nature of the consequences of a fall or accident is not predictable.

Bicycles Cannot Protect You

Bicycles are lightweight, human-powered vehicles. Unlike a car, much like a motorcycle, there is no restraint system for your body, no protective structure around your body. Crash worthiness cannot be a design criterion. A rider sits on a bicycle and can be easily thrown off for many reasons including overly hard use of the front brakes (See PART I, SECTION 4.C Brakes) or striking an obstacle.

BICYCLING INHERENT RISK

⚠ WARNING

BICYCLING IS AN ACTIVE SPORT WITH INHERENT RISK.

"Inherent risk," means that due to the nature of bicycle riding, the situations you encounter while riding expose you to the risk of serious injury, paralysis, or death in an accident.

The risk can not be taken away or eliminated. You can minimize risk by doing the following:

- Bicycle training & practice
- Progressive step-by-step learning of new cycling skills
- The good judgement to ride in control
- Bicycle experience, riding with experienced riders
- Use of a proper bicycle helmet and appropriate protective gear
- Reading and thinking about this entire owner's manual, all owner's manual supplements and instructions that came with your bicycle are essential to your safety and part of the learning process. Visit www.cannondale.com/bikes/tech/manuals.
- Riding within your own unique capabilities and considering the conditions where you are riding.

WARNING LABEL

We urge you to locate the warning label on your bike. It contains important information that you and anyone else who rides your bike should read and follow.

Do not remove it. If you bought an older Cannondale or are refinishing any Cannondale, contact us for a no charge replacement.

WARNING
To REDUCE the risk of SERIOUS or FATAL INJURY
• ALWAYS WEAR a helmet.
• NEVER ride a bike with any damage.
• INSPECT your bike for cracks or damage BEFORE each ride and AFTER any crash or impact. See "Inspect For Safety" in your owner's manual.
• READ and FOLLOW the owner's manual and supplements before riding.
For more information, see a Cannondale dealer, call us at 1-800-BIKE-USA, or go to www.cannondale.com/tech/safety
Meets or exceeds applicable: CPSC-1512, BS6102:Part 1 1992
Conforme aux exigencies de sécurité
206900

Figure 19.

RIDING IN TRAFFIC, COMMUTING

WARNING

RIDING IN TRAFFIC (AND COMMUTING) IS HAZARDOUS AND YOU CAN BE SEVERELY INJURED OR KILLED DOING IT.

As noted in PART I of this manual, you must learn and obey local traffic laws. Riding in traffic is hazardous. We cannot teach you about all of these hazards. We suggest:

Effective Cycling (ISBN 0-262-06159-7) by John Forester.

And, **www.bicyclesafe.com** by Michael Bluejay "How to Not Get Hit by Cars: Important lessons on Bicycle Safety"

Here are just some important topics you must consider:

Traffic Law, Accidents,Intersections, Commuting And Utility Cycling Where To Ride, On Roadway,Changing Lanes In Traffic,Riding At Night, Improving Your Odds With Safety, Lighting , And Weather Equipment

Many bike clubs conduct training programs and workshops that focus on these and other safe cycling topics. Ask at your local bike shop. Seek the advice of an experienced bicycle commuter at your retailer.

PART II

RIDING AT NIGHT, DUSK, DAWN

WARNING

RIDING AT NIGHT/DUSK OR AT DAWN IS VERY HAZARDOUS.

Avoid riding at night. If you choose to ride at night:

- Install front and rear lights.
- Install a blinker or strobe light.
- Check your state or national laws. Lights are required for riding at dusk, night, or dawn.
- Wear reflective clothing.
- Stay alert, others may not see you.
- Make sure your bicycle is equipped with all required reflectors, lights, strobes, or blinkers.

Required Reflectors

The location and type of each reflector on your bike is required by a national authority, in the US, the US Consumer Product Safety Commission (CPSC). Your Cannondale bike must be delivered with: 1. A front mounted forward facing reflector 2. A rear mounted, rear facing reflector, 3. A spoke mounted reflector on each wheel, 4. Front and rear facing reflectors on the left and right pedal. **DO NOT REMOVE, BLOCK, OR COVER REFLECTORS.**

Much Higher Risks At Night

The risk of an accident, particularly being struck by a motor vehicle, is much higher at night. If you choose to accept this higher risk, improve your odds with a proper lighting system, strobe light, light colored reflective clothing and careful riding. Seek the advice of an experienced bicycle commuter at your retailer.

Mountain Biking At Night

Mountain biking at night is risky. Take the challenges outlined in SECTION C. and add another level of difficulty and risk. Seeing the terrain is much more difficult at night. Mountain biking at night is only for skilled mountain bikers, on familiar terrain, with excellent light systems, riding with other skilled mountain bikers, and riding cautiously.

Adding Lighting

REFLECTORS ARE NOT A SUBSTITUTE FOR PROPER LIGHTS. IT IS YOUR RESPONSIBILITY TO EQUIP YOUR BICYCLE WITH ALL NATIONAL, STATE AND LOCALLY MANDATED LIGHTS.

Riding at dawn, at dusk, at night or at other times of poor visibility without a bicycle lighting system which meets local and state laws and without reflectors is dangerous and may result in serious injury or death.

If you ride your bike before dawn or after dusk, your bicycle must be equipped with lights so that you can see the road and avoid road hazards, and so that others can see you. Traffic laws treat bicycles like any other vehicle. That means you must have a white front and a red rear light operating if you are riding after dusk. Your bike dealer can recommend a battery or generator powered lighting system appropriate to your needs.

Flashing (blinker) and Strobe Lighting

Cannondale also strongly urges you to use a flashing light or strobe. All of us at Cannondale who ride at night or in conditions of lower visibility use flashers. They can save your life. (Yeah, we know there may be legal issues with flashers in some areas. They can save your life. Enough said.)

REFINISHING

⚠ WARNING

WE KNOW THAT BIKE OWNER'S REFINISH AND REPAINT BIKES. NO OWNER'S MANUAL OR VOIDED WARRANTY WILL PREVENT THIS. WE CAN'T PREDICT ALL THE THINGS THAT COULD GO WRONG IN THE REFINISHING PROCESS. WHAT WE HOPE TO COMMUNICATE TO YOU IN THE FORM OF THIS WARNING IS THAT:

1. Incorrectly refinishing or repainting your bike can lead to a serious accident.
2. Refinishing could hide structural damage (fatigue cracks, dented or bent tubes, or other structural problems) also leading to an accident. You can be injured or killed.

PRECAUTIONS:

- Chemicals that might be used in refinishing might attack your frame and/or fork (carbon fiber) and weaken them.
- Removing original paint, decals (sanding, scouring, scratching, or blasting) can actually remove frame material possibly weakening them.
- Refinishing can not fix structural problems; refinishing might conceal serious damage.

IF YOU DECIDE TO REFINISH: (suggestions)

- Understand that your Cannondale warranty will be voided
- Go to a professional bicycle repainter (often a frame builder).
- Ask about the professional's experience with aluminum and/or carbon frames.
- Be sure your frame is never sanded with paper coarser than 150 grit.

MODIFICATIONS

⚠ WARNING

DO NOT MODIFY YOUR BIKE FRAME OR COMPONENTS IN ANY WAY. MODIFICATIONS CAN CAUSE DAMAGE LEADING TO FAILURE AND ACCIDENT. YOU CAN BE SEVERELY INJURED OR KILLED.

Do not physically alter your frame in any way. Don't sandblast, shot blast or glass bead your frame. Don't use any coarse sandpaper on your bike. Don't grind, wire brush, file, scrape or machine buff your frame. Don't weld, braze or let anyone touch your frame with a torch. Don't drill any holes in your frame. Don't acid dip or etch your frame. Don't anodize or chrome plate your frame. Any of these procedures will seriously harm the structural integrity and/or longevity of your frame, which could lead to serious accident and injury.

Modifications will void any applicable warranty.

PART II

CHILD CARRIERS

⚠ WARNING

CHILD CARRIERS ADD WEIGHT AND RAISE THE CENTER OF GRAVITY, MAKING BALANCE AND CORNERING MORE DIFFICULT. IF YOU LOOSE CONTROL, YOU AND YOUR CHILD PASSENGER CAN BE SEVERELY INJURED OR KILLED.

Cannondale urges you NOT to install child carriers on bicycles. If you choose to install a child carrier, have an experienced bicycle mechanic install it. Install only on a compatible bicycle. If you insist on using a child carrier we urge that you confirm with both the carrier rack manufacturer and the child carrier manufacturer that the two products are safely compatible. Always use caution when riding with a child carrier.

Some saddles are equipped with coil springs. If you use a rear rack mounted child carrier there is a risk that a child's fingers could be injured if trapped in the coil springs when the rider hits a bump and the springs compress. Be sure that the child cannot reach the springs when properly strapped in the carrier.

Cannondale encourages use of trailers for children. Be very careful when towing a trailer. Remember that braking distances increase, and the trailer will track inside the line of the bicycle when making turns. Children should always wear helmets when riding in a child carrier or trailer. Use of bicycle helmets on children is required by law in many areas.

BICYCLES HAVE SHARP SURFACES

⚠ WARNING

BICYCLES HAVE EXPOSED SHARP SURFACES.

Exercise caution with chainrings and pointed, aggressive platform pedals, as they have sharp and potentially dangerous surfaces. Use caution when working on your bike. If you slip or fall you could be injured.

BAR ENDS

Cannondale urges consumers not to install "Bar Ends" on bicycles. Some handlebars are designed to take the added stress of bar ends, others are not. Very lightweight handlebars may be particularly poorly suited for bar ends. If you want bar ends, consult your Authorized Cannondale Retailer about suitable choices, read and follow instructions and warnings that accompany the handlebars and bar ends, and inspect the handlebars and bar ends regularly.

INSTALLING ACCESSORIES

Have all accessories mounted by your Authorized Cannondale Retailer. Be sure that any accessory you or your authorized retailer fits to your bike does not block or interfere with nationally required reflectors or lights.

⚠ WARNING

INCOMPATIBLE ACCESSORIES OR POORLY OR IMPROPERLY MOUNTED ACCESSORIES CAN ADVERSELY AFFECT THE PERFORMANCE OF YOUR BICYCLE AND MAY BE UNSAFE.

TIRE SIZE

WARNING

Mounting the wrong size tires can result in the tires hitting the fork or frame when riding. If this happens, you can lose control of your bike and you can be thrown off, a moving tire can be stopped because it touches the fork or frame.

Do not mount oversized tires, ones that rub or hit the fork or frame, ones that result in too little clearance, or ones that can hit the fork or frame when the suspension is fully compressed or when riding.

Take care that the tires you select are compatible with your bike's fork or frame design. Also, be sure to follow the manufacturer's recommendations of your front fork and rear shocks.

When you are considering tires for your bike consider...

The actual measured size of a tire may be different than its sidewall marking. Each time you mount a new tire, take the time to inspect the actual clearance between the rotating tire and all parts of the frame. The U.S. Consumer Product Safety Commission (CPSC) requires at least 1/16" (1.6 mm) tire clearance from any part of the bike. Allowing for lateral rim flex and a wheel or rim that is out-of-true will likely mean choosing a rear tire that provides even more clearance than the CPSC recommends.

ASK YOUR CANNONDALE DEALER FOR THE RIGHT TIRES FOR YOUR BIKE AND ITS PARTICULAR COMPONENTS!

YOU CAN BE SEVERELY INJURED, PARALYZED OR KILLED IN AN ACCIDENT IF YOU IGNORE THIS WARNING.

AERODYNAMIC HANDLEBARS

Aerodynamic or "Triathlon" handlebar extensions are fitted to some triathlon or racing bikes. They are also added by customers. Understand that when riding on these extensions your steering and braking are adversely affected. Some riders find it harder to bend their neck to see forward. Be sure to practice riding with aero handlebar extensions on hazard and traffic free roads. Practice the transition from having your hands on the extensions to having your hands on the regular handlebars and brake levers.

WARNING

DO NOT RIDE ON THE AERO HANDLEBAR EXTENSIONS IN TRAFFIC OR ON DIFFICULT ROADS.

Ride on the aero handlebar extensions only when the road is clear of traffic and hazards and you have a long line of sight.

When using the extensions understand that you are compromising steering and braking in favor of speed. If you need to take evasive steering or braking action while on the extensions you could have an accident, with risk of serious injury, paralysis or death.

PART II

ABOUT SHIMMY

Some cyclists have experienced disturbing "shimmy" or "vibration" at certain speeds. This symptom is rarely reported and there is no agreement among experts as to the cause. Among the proposed causes of shimmy are: a loose headset, frame alignment problems, weight of front wheel magnets for cycle computers, and spoke tension.

Larger riders on larger frames are thought by some to be more likely to experience such vibration.

If you experience such a vibration, gently apply the brakes and slow down. Another suggestion is to press your leg against the top tube as you slow down.

⚠ WARNING

IF YOU EXPERIENCE "SHIMMY," DO NOT RIDE CONTINUE TO RIDE YOUR BIKE. TAKE THE BICYCLE TO YOUR RETAILER FOR INSPECTION, SERVICE, OR CHANGES.

TOE CLIP OVERLAP

What is It?

"Toe clip overlap" or "toe overlap" describes the toe of your shoe or toe clip contacting the front tire (or front fender). This may occur when the pedal with your shoe (with or without a toe clip) is all the way forward and the front wheel is turned sharply to a position where the toe or toe clip can contact the tire (or fender). If you ride with clipless pedals, attach your riding shoes to the pedals and check for front tire clearance.

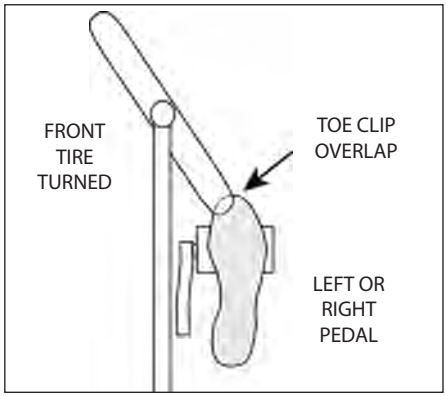


Figure 20.

"Toe clip overlap" is common on small frame size bicycles. It is simple to avoid any contact with the front tire: have the inside pedal up before beginning a turn. As you turn to the left, the inside (left) pedal should be positioned at twelve o'clock. As you turn to the right, the inside (right) pedal should be positioned at twelve o'clock. Having the inside pedal up will prevent any toe clip-to-tire contact and maximize cornering ground clearance. Learn to make it your habit on any sized bike.

Whether or not you have overlap, or how much overlap you have can be changed. Be aware that toe clearance can be increased or decreased by changes in crank arm length, size of pedals or toe clips used, size of tires used, addition of fenders, size/design of shoes worn.

⚠ WARNING

TOE CLIP OVERLAP COULD CAUSE YOU TO LOSE CONTROL OF YOUR BIKE, FALL AND BE SERIOUSLY INJURED, PARALYZED OR KILLED.

Please consult with your retailer on the simple steps you must follow to avoid an accident. Insist that your retailer work with you to determine if your own combination of bicycle, shoe(s) and components have this common design feature.

BRAKE POWER MODULATORS

Your bike may be equipped with a brake modulator, a device installed between the front brake lever and the front brake to reduce initial front braking force. (Brake power modulators are also used on the rear brake of some bicycles.)

If a rider applies the front brake too strongly or too suddenly, these devices can help reduce the risk of locking the front wheel or throwing the rider. Once the modulator device is bottomed out, the front brakes have the same power, and the same risks of overly hard use, as brakes without a modulator. Modulators are a small help in giving a rider more of a chance to react correctly.

Modulators are not a substitute for practicing and learning to brake correctly. See PART I, SECTION 4.C.

⚠ WARNING

A BRAKE MODULATOR WILL NOT PREVENT WHEEL LOCK UP OR BEING THROWN OFF THE BIKE DUE TO OVERLY HARD OR FAST OR ABRUPT APPLICATION OF THE BRAKES.

It is important that you understand modulators are not an intelligent, sophisticated system. Modulators ARE NOT anti-lock braking systems (ABS). Bicycle brake modulators are not like ABS in a car. Unlike automotive ABS there is not an intelligent system of sensors and computer control. Unlike an ABS system in a car you cannot just jam on the brakes and let the system take over. There is no system to think or act for you.

Some people, including sales people, may try to explain brake modulators on bicycles by saying that they are "like ABS". This is misleading and inaccurate.

We urge you to ask your retailer to confirm if you have a brake modulator on your bike. We urge you to ask your retailer to demonstrate how it works. We urge you to work with the front brake lever while standing still to understand how it works. We urge you to read any brake and brake modulator instructions that came with your bike.

AFTERMARKET BRAKE SYSTEMS

⚠ WARNING

DO NOT MODIFY YOUR BIKE IN ANY WAY TO MOUNT BRAKES SYSTEMS. MODIFCATIONS CAN DAMAGE YOUR BIKE LEADING TO AN ACCIDENT. YOU CAN BE SEVERELY INJURED OR KILLED.

Choose only brakes that mount to the frame, swingarm, or fork using only the existing disc brake, V-brake or cantilever mounts. Do not modify the existing mounts or clamp, weld, or in any other way add new or different mounts. Any modification will void the warranty and may weaken or damage the frame. For installation instructions and other warnings, read the literature provided by the brake manufacturer.

When choosing replacements, please ask your Cannondale Dealer. Have your bike's brakes installed and adjusted by a professional bike mechanic.

PART II

AFTERMARKET POWER SYSTEMS

WARNING

DO NOT INSTALL A POWER SYSTEM (GAS OR ELECTRIC TYPE) ONTO YOUR BIKE.

Your Cannondale bike was not designed or intended for use with any type of aftermarket power system.

There are many types of power systems from many different manufacturers. We simply can't predict what all can go wrong by installing one.

We can say that installing an aftermarket power system represents a MAJOR modification of your bike. It will change the way your bike handles and fundamentally alter its operation.

When combined with your bike, the power system can be become dangerous to operate.. For example, the brakes may not be adequate for higher speeds.

SECTION B.
INTENDED USE

⚠ WARNING

UNDERSTAND YOUR BIKE AND ITS INTENDED USE. CHOOSING THE WRONG BICYCLE FOR YOUR PURPOSE CAN BE HAZARDOUS. USING YOUR BIKE THE WRONG WAY IS DANGEROUS.

No one type of bicycle is suited for all purposes. Your retailer can help you pick the "right tool for the job" and help you understand its limitations. There are many types of bicycles and many variations within each type. Cannondale makes many types of mountain, road, racing, hybrid, touring, cyclocross and tandem bicycles.

There are also bicycles that mix features. For example we have road/racing bikes with triple cranks. These bikes have the low gearing of a touring bike, the quick handling of a racing bike, but are not well suited for carrying heavy loads on a tour. For that purpose you want a touring bike.

Within each of type of bicycle, one can optimize for certain purposes. Visit your bicycle shop and find someone with expertise in the area that interests you. Do your own homework. Seemingly small changes such as the choice of tires can improve or diminish the performance of a bicycle for a certain purpose.

On the following pages, we generally outline the intended uses of various types of bikes.

Industry usage Conditions are generalized and evolving. Consult your Cannondale Dealer about how you intend to use your bike.

In addition to this section, please consult any Cannondale Owner's Manual Supplements or components manufactuer's instructions for information on intended use.

PART II

HIGH-PERFORMANCE ROAD

CONDITION 1

Bikes designed for riding on a paved surface where the tires do not lose ground contact.

CANNONDALE BIKE MODELS

Super Six, Slice Carbon, Six Carbon, Six, Slice, Synapse, CAAD7, CAAD8, CAAD9, Ironman, SystemSix, CAPO, All Road Tandems

INTENDED

To be ridden on paved roads only.

NOT INTENDED

For off-road, cyclocross, or touring with racks or panniers.

TRADE OFF

Material use is optimized to deliver both light weight and specific performance. You must understand that (1) these types of bikes are intended to give an aggressive racer or competitive cyclist a performance advantage over a relatively short product life, (2) a less aggressive rider will enjoy longer frame life, (3) you are choosing light weight (shorter frame life) over more frame weight and a longer frame life, (4) you are choosing light weight over more dent resistant or rugged frames that weigh more. All frames that are very light need frequent inspection for cracks that would indicate that the frame is worn out from fatigue. These frames are likely to be damaged or broken in a crash. They are not designed to take abuse or be a rugged workhorse.

MAXIMUM WEIGHT LIMIT

RIDER lbs / kg	LUGGAGE * lbs / kg	TOTAL lbs / kg
275 / 125	10 / 4.5	285 / 129

* Seat Bag /Handlebar Bag Only

GENERAL PURPOSE RIDING

CONDITION 2

Bikes designed for riding Condition 1, plus smooth gravel roads and improved trails with moderate grades where the tires do not lose ground contact.

CANNONDALE BIKE MODELS:

Hooligan, Street, Touring, Trekking, Adventure, Comfort, Quick, Bad Boy, All Cyclocross, Street Tandem,

INTENDED

For paved roads, gravel or dirt roads that are in good condition, and bike paths.

NOT INTENDED

For off-road or mountain bike use, or for any kind of jumping. Some of these bikes have suspension features, but these features are designed to add comfort, not off-road capability. Some come with relatively wide tires that are well suited to gravel or dirt paths. Some come with relatively narrow tires that are best suited to faster riding on pavement. If you ride on gravel or dirt paths, carry heavier loads or want more tire durability talk to your dealer about wider tires.

MAXIMUM WEIGHT LIMIT

RIDER lbs / kg	LUGGAGE lbs / kg	TOTAL lbs / kg
300 / 136	30 / 14	330 / 150
Touring/Trekking		
300 / 136	55 / 25	355 / 161

PART II

CROSS-COUNTRY, MARATHON, HARDTAILS

CONDITION 3

Bikes designed for riding Conditions 1 and 2, plus rough trails, small obstacles, and smooth technical areas, including areas where momentary loss of tire contact with the ground may occur. NOT jumping. All mountain bikes without rear suspension are Condition 3, and so are some lightweight rear suspension models.

CANNONDALE BIKE MODELS

Rush, Rush Carbon, Taurine, Caffeine, Scalpel, F-Series, Law Enforcement

INTENDED

For cross-country riding and racing which ranges from mild to agressive over intermediate terrain (e.g., hilly with small obstacles like roots, rocks, loose surfaces and hard pack and depressions). There are no large "sick drop" or drop offs, jumps or launches (wooden structures, dirt embankments) requiring long suspension travel or heavy duty components. Cross-country and marathon equipment (tires, shocks, frames, drive trains) are light-weight, favoring nimble speed over brute force. Suspension travel is relatively short since the bike is intended to move quickly on the ground and not spend time in the air landing hard and hammering through things.

NOT INTENDED

For use in extreme forms of jumping/riding such as hardcore mountain, Freeriding, Downhill, North Shore, Dirt Jumping, Hucking etc.

TRADE OFF

Cross-Country bikes are lighter, faster to ride uphill, and more nimble than All-Mountain bikes. Cross-Country and Marathon bikes trade off some ruggedness for pedaling efficiency and uphill speed.

MAXIMUM WEIGHT LIMIT

RIDER lbs / kg	LUGGAGE * lbs / kg	TOTAL lbs / kg
300 / 136	5 / 2.3	305 / 138
* Seat Bag Only		
Front suspension frames manufactured w/ original equipment seatstay and dropout rack mounts only.		
300 / 136	55 / 25	355 / 161

ALL MOUNTAIN

CONDITION 4

Bikes designed for riding Conditions 1, 2, and 3, plus rough technical areas, moderately sized obstacles, and small jumps.

CANNONDALE BIKE MODELS

Prophet, Jekyll, Rize, Moto

INTENDED

For trail and uphill riding. All-Mountain bicycles are: (1) more heavy duty than cross country bikes, but less heavy duty than Freeride bikes, (2) lighter and more nimble than Freeride bikes, (3) heavier and have more suspension travel than a cross country bike, allowing them to be ridden in more difficult terrain, over larger obstacles and moderate jumps, (4) intermediate in suspension travel and use components that fit the intermediate intended use, (5) cover a fairly wide range of intended use, and within this range are models that are more or less heavy duty. Talk to your retailer about your needs and these models.

NOT INTENDED

For Hardcore Freeriding, Extreme Downhill, Dirt Jumping, Slopestyle, or very aggressive or extreme riding .

TRADE OFF

All-Mountain bikes are more rugged than cross country bikes, for riding more difficult terrain. All-Mountain bikes are heavier and harder to ride uphill than cross country bikes. All-Mountain bikes are lighter, more nimble and easier to ride uphill than Freeride bikes. All-Mountain bikes are not as rugged as Freeride bikes and must not be used for more extreme riding and terrain.

MAXIMUM WEIGHT LIMIT

RIDER lbs / kg	LUGGAGE * lbs / kg	TOTAL lbs / kg
300 / 136	5 / 2.3	305 / 138

* Seat Bag Only

PART II

GRAVITY, FREERIDE, AND DOWNHILL

CONDITION 5

Bikes designed for jumping, hucking, high speeds, or aggressive riding on rougher surfaces, or landing on flat surfaces. However, this type of riding is extremely hazardous and puts unpredictable forces on a bicycle which may overload the frame, fork, or parts. If you choose to ride in Condition 5 terrain, you should take appropriate safety precautions such as more frequent bike inspections and replacement of equipment. You should also wear comprehensive safety equipment such as a full-face helmet, pads, and body armor.

CANNONDALE BIKE MODELS

Gemini, Perp, Judge,

INTENDED

For riding that includes the most difficult terrain that only very skilled riders should attempt.

Gravity, Freeride, and Downhill are terms which describe hardcore mountain, north shore, slopestyle. This is "extreme" riding and the terms describing it are constantly evolving.

Gravity,Freeride, and Downhill bikes are: (1) heavier and have more suspension travel than All-Mountain bikes, allowing them to be ridden in more difficult terrain, over larger obstacles and larger jumps, (2) the longest in suspension travel and use components that fit heavy duty intended use. While all that is true, there is no guarantee that extreme riding will not break a Freeride bike.

The terrain and type of riding that Freeride bikes are designed for is inherently dangerous. Appropriate equipment, such as a Freeride bike, does not change this reality. In this kind of riding, bad judgment, bad luck, or riding beyond your capabilities can easily result in an accident, where you could be seriously injured, paralyzed or killed.

NOT INTENDED

To be an excuse to try anything! Read our "Freeride & Downhill" warning. See page 64.

TRADE OFF

Freeride bikes are more rugged than All-Mountain bikes, for riding more difficult terrain. Freeride bikes are heavier and harder to ride uphill than All-Mountain bikes.

MAXIMUM WEIGHT LIMIT

RIDER lbs / kg	LUGGAGE * lbs / kg	TOTAL lbs / kg
300 / 136	5 / 2.3	305 / 138

* Seat Bag Only

DIRT JUMP

CONDITION 5

Bikes designed for jumping, hucking, high speeds, or aggressive riding on rougher surfaces, or landing on flat surfaces. However, this type of riding is extremely hazardous and puts unpredictable forces on a bicycle which may overload the frame, fork, or parts. If you choose to ride in Condition 5 terrain, you should take appropriate safety precautions such as more frequent bike inspections and replacement of equipment. You should also wear comprehensive safety equipment such as a full-face helmet, pads, and body armor.

CANNONDALE BIKE MODELS

Chase

INTENDED

For man-made dirt jumps, ramps, skate parks other predictable obstacles and terrain where riders need and use skill and bike control, rather than suspension. Dirt Jumping bikes are used much like heavy duty BMX bikes.

A Dirt Jumping bike does not give you skills to jump! Read our "Freeride & Downhill" warning. See page 64. The same message is true.

NOT INTENDED

For terrain, drop offs or landings where large amounts of suspension travel are needed to help absorb the shock of landing and help maintain control.

TRADE OFF

Dirt Jumping bikes are lighter and more nimble than Freeride bikes, but they have no rear suspension and the suspension travel in the front is much shorter.

MAXIMUM WEIGHT LIMIT

RIDER lbs / kg	LUGGAGE lbs / kg	TOTAL lbs / kg
300 / 136	0	300 / 136

PART II

CYCLOCROSS

CONDITION 2

Bikes designed for riding Condition 1, plus smooth gravel roads and improved trails with moderate grades where the tires do not lose ground contact.

CANNONDALE BIKE MODELS

All Cyclocross

INTENDED

For cyclocross riding, training and racing. Cyclocross involves riding on a variety of terrain and surfaces including dirt or mud surfaces. Cyclocross bikes also work well for all weather rough road riding and commuting.

NOT INTENDED

For off road or mountain bike use, or jumping. Cyclocross riders and racers dismount before reaching an obstacle, carry their bike over the obstacle and then remount. Cyclocross bikes are not intended for mountain bike use. The relatively large road bike size wheels are faster than the smaller mountain bike wheels, but not as strong.

MAXIMUM WEIGHT LIMIT

RIDER lbs / kg	LUGGAGE lbs / kg	TOTAL lbs / kg
300 / 136	30 / 13.6	330 / 150

ROAD TANDEMS

CONDITION 1

Bikes designed for riding on a paved surface where the tires do not lose ground contact.

CANNONDALE BIKE MODELS

All Road Tandems

INTENDED

Are designed to be ridden on paved roads only. They are not designed for mountain biking or off-road use. Cannondale road tandems are designed for touring with racks and panniers.

NOT INTENDED

Road tandem should not be taken off-road or used as a mountain tandem.

Please read your Cannondale Tandems Owner's Manual Supplement. It contains important safety information specific to tandem riding!

MAXIMUM WEIGHT LIMIT

RIDER(s) lbs / kg	LUGGAGE lbs / kg	TOTAL lbs / kg
500 / 227	75 / 34	575 / 261

MOUNTAIN TANDEMS

CONDITION 2

Bikes designed for riding Condition 1, plus smooth gravel roads and improved trails with moderate grades where the tires do not lose ground contact.

CANNONDALE BIKE MODELS

All Mountain Tandems

INTENDED

The challenges of mountain biking are obvious, but are outlined in PART II, SECTION C. MOUNTAIN BIKE RIDING of this manual . The added challenges of tandem riding, mean that you should limit off-road tandem riding to easy-moderate terrain.

Please read your Cannondale Tandems Owner's Manual Supplement. It contains important safety information specific to tandem riding!

NOT INTENDED

For very agressive mountain bike riding. Mountain tandems are most definitely NOT for Downhill, Freeriding, North Shore. Choose terrain with the abilities of both the Tandem's captain and stoker in mind.

MAXIMUM WEIGHT LIMIT

RIDER(s) lbs / kg	LUGGAGE lbs / kg	TOTAL lbs / kg
500 / 227	75 / 34	575 / 261

PART II

SECTION C. MOUNTAIN BIKE RIDING

See also **APPENDIX B. Maximum Fork Length.**

See also SECTION B. Intended Use.

OFF-ROAD RIDING

Off road riding usually involves many, many variables such as constantly changing traction, obstacles, changes in line of sight, up hill, down hill, soft surfaces, dry surfaces, wet surfaces. Off road riding requires managing a complex and constantly changing rider–to-bicycle feedback loop of traction, weight distribution, application of power, application of brakes and steering driven by the conditions one encounters. The complexity and ever-changing nature of off road riding requires focus, concentration, strength, fitness and learning to read the trail. The art of managing all this while surrounded by nature makes this a challenging and wonderful sport.

If you have ridden your mountain bike on a paved road, or on a gravel or dirt road, you have done very little in the way of learning to mountain bike. Learning to ride off road is a process. It does not automatically occur because you have a mountain bike. Learning to ride off road does not come from watching "extreme" mountain bike videos or TV. In fact the riders in those films are professional entertainers and/or daredevils, not teachers.

⚠ WARNING

MOUNTAIN BIKE RIDING IS VERY DIFFERENT FROM RIDING A BIKE ON THE ROAD. For starters, it is almost certain you will fall off.

Get training! Join a club and find experienced people to teach you. It is likely that your retailer can hook you up with local rides. Practice and learn to stay in control. Carefully, progressively, learn to expand your limits, but always ride within them.

BIKE TYPES

⚠ WARNING

PICK A MOUNTAIN BIKE FOR HOW YOU WILL RIDE.

There are now many different kinds of "mountain bikes." Cannondale makes mountain bikes ranging from the light, nimble Rush and Scalpels, designed for cross country (XC) racing, to our rugged, long-travel freeride bikes. A Scalpel is not designed for freeride! If you try using your bike for something it was not intended, you may break it with risk of serious injury, paralysis or death.

Matching the intended use of any kind of mountain bike to your expected riding is import.

Read SECTION B. INTENDED USE starting on page 51 .

INSPECTION AND MAINTENANCE ROUTINES

⚠ WARNING

MOUNTAIN BIKE RIDING IS VERY HARD ON BIKES. MOUNTAIN BIKES NEED FREQUENT CLEANING, MAINTENANCE AND INSPECTION.

Clean your bike after every ride and conduct a pre-ride inspection before every ride. Detailed inspection as outlined in SECTION D. in this manual is needed more often than for road bikes. Failure to keep up with maintenance and inspection increases the risk of an accident, with risk of serious injury, paralysis or death.

SUSPENSION

Suspension will increase the handling capabilities and comfort of your bicycle. This enhanced capability may allow you to ride faster, particularly on rough or bumpy surfaces. As common sense tells you, increased speed brings increased risk.

⚠ WARNING

DO NOT CONFUSE THE BUILT-IN CAPABILITIES OF A SUSPENSION BIKE WITH YOUR OWN CAPABILITIES, WHICH MUST BE LEARNED.

Increasing your skill will take time and practice. Stay in control, and carefully, gradually learn the feel and handling of your suspension bike.

When you apply the front brakes on a suspension bike, the front of the bike will fall or dip as weight shifts forward. This is normal. (The front of your car dips when you apply the brakes.) You must learn to anticipate this weight shift and compensate by shifting your body weight back.

JUMPING

⚠ WARNING

JUMPING IS VERY RISKY. YOU COULD HAVE A FALL LEADING TO SERIOUS INJURY, PARALYSIS OR DEATH.

Jumping a mountain bike is fun, but it puts extreme stress on your bike. Perhaps most vulnerable to jumping-related damage is your fork. Riders who insist on jumping their bikes risk serious damage, to their bicycles as well as themselves.

STAY IN CONTROL

⚠ WARNING

FAILURE TO RIDE IN CONTROL COULD RESULT IN A FALL LEADING TO SERIOUS INJURY, PARALYSIS, OR DEATH.

While the risks inherent to this sport cannot be eliminated, you can minimize the risks by riding in control and wearing a helmet. The reality is that simple, and that challenging.

DOWNHILL AND LIFT-SERVICED RIDING

⚠ WARNING

TO RIDE DOWNHILL AT SPEED OR IN COMPETITION IS TO VOLUNTARILY ASSUME A VERY LARGE RISK. YOU COULD BE SERIOUSLY INJURED, PARALYZED, OR KILLED.

When riding downhill such as at a ski area, on trails or access roads, or on dirt roads such as fire roads, you can reach speeds seen on motorcycles, with similar hazards and risks.

Wear appropriate safety gear, including a full face helmet, full finger gloves, protective clothing, and body armor. Have your bicycle and equipment carefully inspected by a qualified mechanic and be sure it is in excellent condition. Consult with expert riders and/or race officials on conditions and equipment advisable at any site where you plan to ride downhill. Experienced riders often pre-walk or carefully and slowly pre-ride a downhill course before attempting it at any speed.

PART II

SHIFTING GEARS WHILE PEDALING

⚠ CAUTION

Shifting under extreme pedaling pressure puts a great amount of stress on components. While most components can withstand an occasional "power shift," continual power shifting will most assuredly damage some part of your drivetrain. Whenever possible, ease up on your pedals when shifting.

This page has been left blank intentionally.

PART II

FREERIDING & DOWNHILL

⚠ WARNING

FREERIDING AND OTHER FORMS OF "EXTREME RIDING" RE EXTREMELY DANGEROUS. YOU CAN BE SEVERELY INJURED OR KILLED IN A SERIOUS ACCIDENT.

Freeriding, jumping, hucking, dirt jumping, mountaincross, downhill, slalom, slopestyle, urban or street riding or other evolving forms of extreme or hard core mountain biking are inherently dangerous and can lead to serious accidents. Wear all safety gear and be sure your bike is in excellent condition. Follow all the instructions and warnings below. These steps will reduce, but not eliminate, the inherent risks. Even with state of the art protective safety gear you could be seriously injured, paralyzed or killed. If you do not want to take these risks, do not engage in this type of riding.

Fundamental Risk

Freeriding, jumping, hucking, dirt jumping, mountaincross, downhill, slalom, slopestyle, urban or street riding. It seems that everywhere you look, from Mountain Dew® commercials to the X-Games® to the Red Bull®Rampage, riders are grabbing big air and sticking sick drops. And it sure looks fun.

But what the videos and bike magazines and ads don't always tell you is that extreme riding takes an amazing amount of skill. Some of the riders you see are well-paid pros who have gradually built up their skills through endless hours of practice, and who have also had their share of stitches, concussions and busted bones (and bikes). Others are daredevils who have chosen to accept or ignore the risks. Would you allow anyone to say that you are so weak in the head, and have such poor judgment that you copy those you see in the media without thought of the serious risks?

The stakes are high if you screw up. Realize too late that you aren't up to the challenge, and you run the risk of major injury or even – say it aloud – death, paralysis. In short, extreme riding carries a high degree of fundamental risk, and you bear the ultimate responsibility for how you ride and what you attempt to pull off. Do you want to avoid these significant risks? Then do not ride this way.

continued on next page.....

Product Limitations

Problems of pilot error aside, hard-core riding also beats the heck out of your equipment. Although we build and test our bikes to make them tough, there's no way that we can guarantee they'll survive your umpteenth six-foot drop. For starters, there is no industry "jumping" standard. The many circumstances of takeoff, landing, speed, rider technique, etc. are unique. The judgment, lack of judgment or insanity of a rider who may ride a Cannondale bicycle cannot be completely predicted, so it's flat-out impossible to predict how anyone's equipment is going to hold up.

Let's get another thing straight. Buying a Freeride bike does not make you any better. Do not confuse the built-in capabilities of equipment with your own capabilities, which must be learned.

Keeping your bike and all its components in good working order is critical, and it's up to you to maintain and inspect it. Even so, your sweet rig isn't going to last forever. Nothing does, particularly bikes and parts that are built to minimize weight and then are subjected to abuse. Cannondale frames carry a warranty, but that's to cover issues with workmanship and/or materials. (See the Cannondale Limited Warranty in this manual). The warranty doesn't mean that they're going to last forever. They're not. The warranty certainly doesn't mean that the bicycle can in any way protect you from injury.

Use of Specialized Protective Gear

Cannondale has long urged the use of helmets. As riskier, extreme downhill and freeriding became part of the sport we communicated frankly about the risks in this freeride warning. We have recently become aware of neck braces, designed for mountain biking and motocross riding, fitted between the rider and helmet, that can decrease the risk of paralysis, spinal cord and neck injuries. As the manufacturer clearly states, these braces cannot prevent all injuries. We urge riders, particularly riders into challenging and risky riding, to investigate and consider prophylactic neck braces (For example, see http://www.leatt-brace.com/). A prophylactic neck brace might save your life or keep you out of a wheelchair.

In Conclusion

If you're going hard-core, be smart about it. Always wear a full face helmet, state-of-the-art neck brace, body armor, full-finger gloves, and protective clothing. Choose a bike that's right for you, your riding and terrain, and check it often for signs of fatigue or other trouble. (Your dealer can help you on both fronts.) Read PART II, SECTION B. MOUNTAIN BIKE RIDING. And most importantly, know your limitations. Practice. Stay in control, and carefully, gradually expand your limits – but ride within them.

YOU CAN BE SEVERELY INJURED, PARALYZED, OR KILLED IF YOU IGNORE THIS WARNING.

PART II

SECTION D. INSPECT FOR SAFETY

In this section, we will do our best to outline some material science basics and explain how they relate to your bicycle, some of the trade offs made in designing your bicycle, what you can expect from your bicycle and provide important, basic guidelines on how you maintain and inspect it.

Carbon fiber bikes and components are becoming more common. In addition to 2. Understanding Composites (Carbon Fiber) in this section, see also:

APPENDIX A, page 86

APPENDIX C, page 88.

APPENDIX D, page 90.

APPENDIX E, page 92

APPENDIX F, page 94

⚠ WARNING

FREQUENT INSPECTION OF YOUR BIKE IS IMPORTANT TO YOUR SAFETY. FOLLOW THE PRE-RIDE CHECKLIST BEFORE EVERY RIDE. See the back cover of this manual.

Periodic, more detailed inspection of your bicycle is important. How often this more detailed inspection is needed depends upon you.

You, the rider/owner, have control and knowledge of how often you use your bike, how hard you use it and where you use it. Cannondale does not. We design rugged and light bicycles and test them extensively. But, because we cannot track your use, you must be responsible for inspection and maintenance. Most customers will have a retailer do all inspection and maintenance.

If you are not interested in the "hands on" aspects of your bicycle, and do not wish to perform inspection or maintenance on your own bike, then you must make your retailer a partner in maintaining and inspecting your bicycle. Work with your retailer to determine a maintenance and inspection schedule appropriate for your riding. PART I, SECTION 5. A provides some general guidelines on service intervals.

For your safety, understanding and communication with your retailer, we urge you to read this section. The materials used to make your bike determine how to inspect it properly.

YOU CAN BE SEVERELY INJURED, PARALYZED, OR KILLED IF YOU IGNORE THIS WARNING.

1. UNDERSTANDING METALS

Steel is the traditional material for building bicycle frames. It has good characteristics, but in high performance bicycles, steel has been largely replaced by aluminum and some titanium. The main factor driving this change is interest by enthusiast customers in lighter bicycles.

Properties of Metals

Please understand that there is no simple statement that can be made that characterizes the use of different metals for bicycles. What is true is how the metal chosen is applied is much more important than the material alone. One must look at the way the bike is designed, tested, manufactured, supported along with the characteristics of the metal rather than seeking a simplistic answer.

Metals vary widely in their resistance to corrosion. Steel must be protected or rust will attack it. Aluminum and Titanium quickly develop an oxide film that protects the metal from further corrosion. Both are therefore quite resistant to corrosion. The 6000 series aluminum alloys Cannondale has used for years are commonly used in marine applications. Aluminum is not perfectly corrosion resistant and particular care must be used where it contacts other metals and galvanic corrosion can occur.

Metals are comparatively ductile. Ductile means bending, buckling and stretching before breaking. Generally speaking, of the common bicycle frame building materials steel is the most ductile, titanium less ductile, followed by aluminum.

Metals vary in density. Density is weight per unit of material. Steel weighs 7.8 grams/cm3 (grams per cubic centimeter), titanium 4.5 grams/cm3, aluminum 2.75 grams/cm3. Contrast these numbers with carbon fiber composite at 1.45 grams/cm3.

Metals are subject to fatigue. With enough cycles of use, at high enough loads, metals will eventually develop cracks that lead to breakage. It is very important that you read Metal Fatigue 101 next.

Let's say you hit a curb, ditch, rock, car, fallen cyclist or other object. First, read the Important warnings at the beginning of SECTION A: *Bicycles Cannot Protect You.* At any speed above a fast walk your body will continue to move forward, momentum carrying you over the front of the bike. You cannot and will not stay on the bike and what happens to the frame and fork is irrelevant to what happens to your body.

What should you expect from your metal frame? It depends on many complex factors, which is why we tell you that crash worthiness cannot be a design criteria. With that important note, we can tell you that if the impact is hard enough the fork or frame may be bent or buckled. **See Figure A on page 68.** On a most all steel bikes, the steel fork may be severely bent and the frame undamaged. Aluminum is less ductile than steel, but you can expect the fork and frame to be bent or buckled. Hit harder and the top tube may be broken in tension and the down tube buckled. Hit harder and the top tube may be broken, the down tube buckled and broken, leaving the head tube and fork separated from the main triangle.

When all metal bikes are crashed you will usually see some evidence of this ductility in bent, buckled or folded metal.

It is now common for the main frame to be made of metal and the fork of carbon fiber. See the composites 101 section below. The relative ductility of metals and the lack of ductility of carbon fiber means that in a crash scenario you can expect some bending or bucking in the metal but none in the carbon. Below some load the carbon fork may be intact even though the frame is damaged. Above some load the carbon fork will be completely broken.

Metal Fatigue 101

Common sense tells us that nothing that is used lasts forever. The more you use something, and the harder you use it, and the worse the conditions you use it in, the shorter its life.

Fatigue is the term used to describe accumulated damage to a part caused by repeated loading. To cause fatigue damage, the load the part receives must be great enough. A crude, often-used example is bending a paper clip back and forth (repeated loading) until it breaks. This simple definition will help you understand that fatigue has nothing to do with time or age. A bicycle in a garage does not fatigue. Fatigue happens only through use.

So what kind of "damage" are we talking about? On a microscopic level, a crack forms in a highly stressed area. As the load is repeatedly applied, the crack grows. At some point the crack becomes visible to the naked eye. Eventually it becomes so large that the part is too weak to carry the same load that, without the crack, it could carry. At that point there can be a complete and immediate failure of the part.

One can design a part that is so strong that fatigue life is nearly infinite. This requires a lot of material and a lot of weight. Any structure that must be light and strong will have a finite fatigue life. Aircraft, race cars, motorcycles: all have parts with finite fatigue lives. If you wanted a bicycle with an infinite fatigue life, it would weigh far more than any bicycle sold today. So we all make a trade-off: the wonderful, lightweight performance we want requires that we inspect the structure.

In most cases a fatigue crack is not a defect. It is a sign that the part has been worn out, a sign the part has reached the end of its useful life. When your car tires wear down to the point that the tread bars are contacting the road, those tires are not defective. Those tires are worn out and the tread bar says "time for replacement." When a metal part shows a fatigue crack, it is worn out. The crack says "time for replacement."

FIGURE A

THIS IS A BENT METAL FORK.

THIS IS A COMPLETELY BROKEN CARBON FORK.

A few things to think about:

• **ONCE A CRACKS STARTS IT CAN GROW AND GROW FAST.** Think about the crack as forming a pathway to failure. This means that any crack is potentially dangerous and will only become more dangerous.

SIMPLE RULE 1: If you find crack, replace the part.

• **CORROSION SPEEDS DAMAGE.** Cracks grow more quickly when they are in a corrosive environment. Think about the corrosive solution as further weakening and extending the crack.

SIMPLE RULE 2: Clean your bike, lubricate your bike, protect your bike from salt, remove any salt as soon as you can.

• **STAINS AND DISCOLORATION CAN OCCUR NEAR A CRACK.** Such staining may be a warning sign that a crack exists.

SIMPLE RULE 3: Inspect and investigate any staining to see if it is associated with a crack.

• **SIGNIFICANT SCRATCHES, GOUGES, DENTS OR SCORING CREATE STARTING POINTS FOR CRACKS.** Think about the cut surface as a focal point for stress (in fact engineers call such areas "stress risers," areas where the stress is increased). Perhaps you have seen glass cut? Recall how the glass was scored and then broke on the scored line.

SIMPLE RULE 4: Do not scratch, gouge or score any surface. If you do, pay frequent attention to this area or replace the part.

• **SOME CRACKS (particularly larger ones) MAY MAKE CREAKING NOISE AS YOU RIDE.** Think about such a noise as a serious warning signal. Note that a well-maintained bicycle will be very quiet and free of creaks and squeaks.

SIMPLE RULE 5: Investigate and find the source of any noise. It may not a be a crack, but whatever is causing the noise should be fixed before riding.

Fatigue Is Not A Perfectly Predictable Science

Fatigue is not a perfectly predictable science, but we can give you some general factors to help you determine how often you need to inspect (or have your retailer inspect) your bicycle. The more you fit the "shorten product life" profile, the more frequent your need to inspect. The more you fit the "lengthen product life" profile, the less frequent your need to inspect.

Factors that shorten product life:

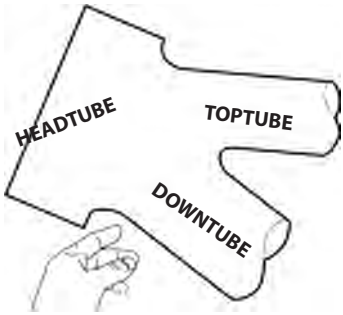
- Hard, harsh riding style
- "Hits," crashes, jumps, other "shots" to bike
- High mileage
- Higher body weight
- Stronger, more fit, more aggressive rider
- Corrosive environment (wet, salt air, winter road salt, accumulated sweat)
- Presence of abrasive mud, dirt, sand, soil in riding environment

Factors that lengthen product life:

- Smooth, fluid riding style
- No "hits," crashes, jumps, other "shots" to bike
- Low mileage
- Lower body weight
- Less aggressive rider
- Non-corrosive environment (dry, salt-free air)
- Clean riding environment

Aluminum Frame Inspection

1. Clean the bike and remove the wheels.
2. Inspect the whole frame carefully for cracks. Pay particular attention to the underside of the downtube where it intersects the headtube
3. Next carefully inspect the area where the crankset and rear wheel come closest to the right chainstay, particularly on the innermost part of the chainstay and the outermost part of the chainstay. Next look at the welds that join all of the tubes. Be sure to look at the inside of the rear triangle or swingarm while the wheel is out, including the dropouts.
4. Finally check all mounting points such as disc brake caliper brackets and water bottle and rack mounts.



Inspect this area for cracking

Figure 21.

⚠ WARNING

DO NOT RIDE A FRAME OR FORK WITH ANY CRACK, EVEN A SMALL ONE. RIDING A CRACKED FRAME OR FORK COULD LEAD TO YOUR FRAME/FORK BREAKING, WITH RISK OF ACCIDENT, SERIOUS INJURY, PARALYSIS OR DEATH.

Fork Inspection

1. Remove the front wheel.
2. Clean the fork.
3. Carefully inspect the whole fork for cracks. Pay particular attention to the fork crown area and the area where the dropouts meet the fork blades. Look on the inside of the fork while the wheel is out. Check the area around the brake pivot bosses or caliper mount.

Cannondale Headshok or Lefty Forks

If you have a Cannondale fork you must follow the special inspection instructions in the Owner's Manual Supplement that came with your bike. If you do not have this owner's manual supplement, get one now.

For important inspection and safety information see your owner's manual supplement or visit http://www.cannondale.com/bikes/tech/index.html.

Other Suspension Forks

If you have a fork made by a third party, please read and follow the inspection instructions contained in the manual that covers that fork. If you do not have the third party's manual, get one now.

⚠ WARNING

RIDING WITH AN IMPROPERLY SECURED WHEEL CAN ALLOW THE WHEEL TO WOBBLE OR FALL OFF THE BICYCLE, WHICH CAN CAUSE SERIOUS INJURY OR DEATH. THEREFORE, IT IS ESSENTIAL THAT YOU:

1. Ask your dealer to help you make sure you know how to install and remove your wheels safely.
2. Understand and apply the correct technique for clamping your wheel in place.
3. Each time, before you ride the bike, check that the wheel is securely clamped.

The clamping action of a correctly secured wheel must emboss the surfaces of the dropouts.

See SECTION 4. A Wheels on page 20.

PART II

2. UNDERSTANDING COMPOSITES (CARBON FIBER)

All riders must understand a fundamental reality of composites. Composite materials constructed of carbon fibers are strong and light, but when crashed or overloaded, carbon fibers do not bend, they break.

What Are Composites?

The term "composites" refers to the fact that a part or parts are made up of different components or materials. You've heard the term "carbon fiber bike." This really means "composite bike."

Carbon fiber composites are typically a strong, light fiber in a matrix of plastic, molded to form a shape. Carbon composites are light relative to metals. Steel weighs 7.8 grams/cm3 (grams per cubic centimeter), titanium 4.5 grams/cm3, aluminum 2.75 grams/cm3. Contrast these numbers with carbon fiber composite at 1.45 grams/cm3.

The composites with the best strength-to-weight ratios are made of carbon fiber in a matrix of epoxy plastic. The epoxy matrix bonds the carbon fibers together, transfers load to other fibers, and provides a smooth outer surface. The carbon fibers are the "skeleton" that carries the load.

Why Are Composites Used?

Unlike metals, which have uniform properties in all directions (engineers call this isotropic), carbon fibers can be placed in specific orientations to optimize the structure for particular loads. The choice of where to place the carbon fibers gives engineers a powerful tool to create strong, light bicycles. Engineers may also orient fibers to suit other goals such as comfort and vibration damping.

Carbon fiber composites are very corrosion resistant, much more so than most metals. Think about carbon fiber or fiberglass boats.

Carbon fiber materials have a very high strength-to-wieght ratio.

What Are The Limits Of Composites?

Well designed "composite" or carbon fiber bicycles and components have long fatigue lives, usually better than their metal equivalents.

While fatigue life is an advantage of carbon fiber, Cannondale still urges you to regularly inspect your carbon fiber frame, fork, or components.

Carbon fiber composites are not ductile. Once a carbon structure is overloaded, it will not bend; it will break. At and near the break, there will be rough, sharp edges and may be delamination of carbon fiber or carbon fiber fabric layers. There will be no bending, buckling, or stretching.

If You Hit Something Or Have A Crash, What Can You Expect From Your Carbon Fiber Bike?

Let's say you hit a curb, ditch, rock, car, fallen cyclist or other object. First, read the Important warnings at the beginning of PART II Section A. Bicycles Cannot Protect You in this manual.

At any speed above a fast walk, your body will continue to move forward, the momentum carrying you over the front of the bike. You cannot and will not stay on the bike and what happens to the frame and fork is irrelevant to what happens to your body.

What should you expect from your carbon frame? It depends on many complex factors, which is why we tell you that crash worthiness cannot be a design criteria. With that important note, we can tell you that if the impact is hard enough, the fork or frame may be completely broken. **See Figure A on page 68.** Note the significant difference in behavior between carbon and metal. 1. Understanding Metals in this section. Even if the carbon frame was twice as strong as a metal frame, once the carbon frame is overloaded it will not bend, it will break completely.

Cannondale carbon frames/fork/components are designed for normal riding loads with a factor of safety. These frames/fork/components will be broken by some crash or impact loads.

See "Composite Frame, Fork, And Component Inspection" on next page.

Composite Frame, Fork, and Component Inspection

Cracks:

Inspect for cracks, broken, or splintered areas. Any crack is serious. Do not ride any bicycle or component that has a crack of any size.

Delamination:

Delamination is serious damage. Composites are made from layers of fabric. Delamination means that the layers of fabric are no longer bonded together. Do not ride any bicycle or component that has any delamination. These are some delamination clues:

- A cloudy or white area. This kind of area looks different from the ordinary undamaged areas. Undamaged areas will look glassy, shiny, or "deep," as if one was looking into a clear liquid. Delaminated areas will look opaque and cloudy.

- Bulging or deformed shape. If delamination occurs, the surface shape may change. The surface may have a bump, a bulge, soft spot, or not be smooth and fair.

- A difference in sound when tapping the surface. If you gently tap the surface of an undamaged composite you will hear a consistent sound, usually a hard, sharp sound. If you then tap a delaminated area, you will hear a different sound, usually duller, less sharp.

Unusual Noises:

Either a crack or delamination can cause creaking noises while riding. Think about such a noise as a serious warning signal. A well maintained bicycle will be very quiet and free of creaks and squeaks. Investigate and find the source of any noise. It may not be a crack or delamination, but whatever is causing the noise must be fixed before riding.

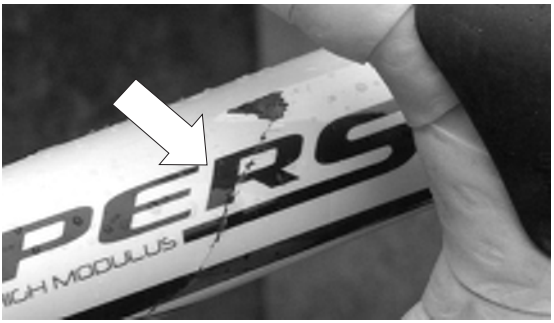
⚠ WARNING

DO NOT RIDE A FRAME OR FORK WITH ANY DELAMINATION OR CRACK. IF YOU RIDE A DELAMINATED OR CRACKED FRAME/FORK/ COMPONENT IT MAY COMPLETELY BREAK APART WITH RISK OF ACCIDENT, SERIOUS INJURY, PARALYSIS OR DEATH.

Damage caused by a handlebar rotating and striking the top tube is common. The resulting impact cracks and breaks the top tube.

This is not a warranty.

The frame is not safe to ride.



Any impact or crash damage can produce serious damage to the frame. This chainstay was cracked in a crash.

This is not a warranty.

The frame is not safe to ride.

PART II

3. UNDERSTANDING COMPONENTS

It is often necessary to remove and disassemble components in order to properly and carefully inspect them. Most customers will use this component list as a checklist. The intention here is to tell you what parts, and what area of each part, most need inspection. Insist that your mechanic do such inspections. Our intention is definitely not to teach bicycle mechanics.

⚠ WARNING

FAILURE TO DISASSEMBLE OR REASSEMBLE BICYCLE COMPONENTS PROPERLY COULD RESULT IN AN ACCIDENT, WITH RISK OF SERIOUS INJURY, PARALYSIS OR DEATH.

There are many special tools and techniques required. Unless you are a very experienced and skilled bicycle mechanic, we urge you to have this work done by a professional bicycle retailer.

IF YOU SEE ANY CRACK, OR ANYTHING YOU ARE UNSURE OF, PLEASE TAKE YOUR BICYCLE TO A RETAILER. IF YOU RIDE A DELAMINATED OR CRACKED FRAME/FORK/COMPONENT IT MAY COMPLETELY BREAK APART WITH RISK OF ACCIDENT, SERIOUS INJURY, PARALYSIS OR DEATH.

IF YOU HAVE CARBON FIBER COMPONENTS, YOU MUST READ PART II, SECTION D. 2. UNDERSTANDING COMPOSITES.

DO NOT ride any component with a crack, even a small one. Replace the component before riding. Break or saw in half any component you replace so that no one uses it again.

■ Aftermarket "Super Light" Components

Think carefully about your rider profile as outlined above. The more you fit the "shorten product life" profile, the more you must question the use of super light components. The more you fit the "lengthen product life" profile, the more likely it is that lighter components may be suitable for you. Discuss your needs and your profile very honestly with your retailer. Take these choices seriously and understand that you are responsible for the changes.

A great slogan to discuss with your retailer as you consider changing components: "Strong, Light, Cheap – Pick two."

■ Original Equipment Components

Cannondale tests the fatigue life of many of the components that are original equipment on your bike. This means that the designs many original equipment components have met our test criteria and have reasonable fatigue life. It does not mean that the original equipment components will last forever. They will not.

■ Stem

Clean and inspect carefully for cracks. Pay particular attention to the underside of the stem. If the stem is of welded construction, examine the edges of each weld. See also the closely related handlebar section below.

■ Handlebars

Remove from stem. With road bars, you will need to remove the handlebar tape. Remove any handlebar mounted components. Clean and inspect carefully for cracks. Pay particular attention to the area where the handlebar emerges from the stem. This is the area where virtually all handlebars will eventually break. Periodic replacement of all handlebars is strongly recommended. How often they need to be replaced depends upon the many factors outlined above.

Be sure that you do not scratch or score the surface of the handlebars with either the stem or the brake or shifter levers. As noted above, any such damage will reduce the life of the handlebar and could lead to breakage.

If you find that there is a sharp edge or burr on the inside of the stem, right where the handlebars emerge, it must be smoothed out with fine sandpaper (220 grit or finer) before the new handlebars are installed. Such a sharp edge or burr could cause a scratching or scoring of the handlebar. As noted above, any such

damage will reduce the life of the handlebar and could lead to breakage.

■ Seat Post

Remove from seat tube and remove from saddle. Disassemble the head/saddle clamp assembly. Clean and inspect all parts carefully for cracks.

Pay particular attention to the bolt (or bolts) that clamp the saddle in place. If the bolt looks stretched, bent or in any way damaged, replace it. Note that these bolts have been known to be broken due to fatigue when not properly tightened. They must be tightened with a torque wrench.

The threads of the seat post bolts be greased before reassembly.

Be sure the clamp assembly is clamped only to the straight parallel part of the saddle rails.

■ Seat Post Lubrication

Clean and apply the following to a seat post before inserting into the frame.

FRAME MATERIAL		SEAT POST LUBRICATION
SEAT TUBE	SEAT POST	
ALLOY	ALLOY	GREASE
ALLOY	CARBON	*CARBON GEL*
CARBON	ALLOY	*CARBON GEL*
CARBON	CARBON	*CARBON GEL*

GREASE - A high-quality bicycle bearing grease

CARBON GEL - Is a gel like lubricant formulated for use with carbon fiber components (Cannondale p/n KF115/).

■ Saddle

While the saddle is off the seat post, clean and inspect the rails carefully for cracks. Check the saddle rails to the saddle body; make sure that the rails are firmly attached.

■ Pedals

Remove both from the crankset. Clean and inspect carefully for cracks. Pay particular attention to the pedal axle. See clipless pedal manufacturer's instructions for information on cleat wear and replacement.

■ Crankset

Remove both sides from the bottom bracket. Clean and inspect all parts carefully for cracks. Examine both inside and outside surfaces. Pay particular attention to edges, shapes and changes of shape that are a part of your particular crankset design. Also check the area around the pedal mounting holes.

■ Wheels

Clean the wheels. Inspect the hub flange, where the heads of the spokes are hooked (or otherwise attached) to the hub flange, for cracks. Inspect the rim where the spokes meet the rim. It is not uncommon to see cracks form where the spokes meet the rim.

■ Brake Track of Wheel Rim

The brake track is the surface of the rim where the brake pads make contact. While not related to fatigue, this surface can be worn out. We urge you to inspect the brake tracks on your rims. They can wear out quite quickly on a mountain bike used in abrasive conditions. Many rims have brake track wear indicators; please ask your retailer to show you this feature.

Some brake pads are very aggressive and speed up wear. If you see a noticeable amount of wear relative to the nearby surface untouched by the brake pads, speak to your retailer about possible replacement. Severely worn brake tracks can lead to a broken wheel.

⚠ WARNING

DO NOT RIDE ON A RIM THAT HAS BEEN WORN OUT!

If the wear indicator shows that the rim is worn out, there is a danger that the rim could be broken due to tire pressure and/or riding loads.

IF THE RIM BREAKS WHILE YOU ARE RIDING YOU COULD HAVE AN ACCIDENT, WITH RISK OF SERIOUS INJURY, PARALYSIS OR DEATH.

PART II

BICYCLE LIFESPAN

NOTHING LASTS FOREVER, INCLUDING YOUR BIKE

When the useful life of your bike or its components is over, continued use is hazardous.

Every Cannondale bicycle frame and the components attached to the frame have a finite, limited useful life. The length of that life will vary with the construction and materials used in the frame and components, the maintenance and care the frame and components receive over their life and the type and amount of use the frame and components are subjected. Use in competitive events, trick riding, ramp riding, jumping, aggressive riding, riding on severe terrain, riding in severe climates, riding with heavy loads, commercial activities and other types of non-standard use can dramatically shorten the life of the frame and components. Any one or a combination of these conditions may result in an unpredictable breakage.

ALL FRAMES AND COMPONENTS SHOULD BE PERIODICALLY CHECKED BY AN AUTHORIZED CANNONDALE RETAILER for indicators of stress and/or potential breakage , including cracks, deformation, delamination, creaking sounds, corrosion, paint peeling, dents, and any other indicators of potential problems, inappropriate use or abuse. These are important safety checks and very important to help prevent accidents, bodily injury to the rider and shortened product life. (See PART I, Section 5 Service and PART II, Section D. Inspect For Safety)

USEFUL LIFE OF LIGHTWEIGHT FRAMES

Lightweight frames and components usually have shorter lives. For example, all aspects of use being identical, a lightweight Super Six, System Six, CAAD7 or CAAD8 frame will have a shorter life than a heavier CAAD3 frame.

In selecting lightweight frames and components you are making a trade-off, favoring the higher performance that comes with light weight over longevity. So, If you choose lightweight, high performance equipment, be sure to inspect it frequently.

SECTION E. MAINTENANCE

WARNING

INSPECTION AND MAINTENANCE ARE IMPORTANT TO YOUR SAFETY AND THE LONGEVITY OF YOUR BICYCLE.

ANY PART OF A POORLY MAINTAINED BIKE CAN BREAK OR MALFUNCTION LEADING TO AN ACCIDENT WHERE YOU CAN BE KILLED, SEVERELY INJURED OR PARALYZED.

Please ask your Cannondale Dealer to help you develop a complete maintenance program, a program which includes a list of the parts on your bike for YOU to check regularly. Frequent checks are necessary to identify the problems that can lead to an accident.

YOU CAN BE SEVERELY INJURED, PARALYZED OR KILLED IN AN ACCIDENT IF YOU IGNORE THIS WARNING.

30 DAY SERVICE

Many retailers offer a special on the first service of your new bike. Whether it is free or not, please be sure to have this first service done. The first service is very important. Many parts of the bike will break in, bed in, stretch or seat themselves through use. This is true even with a perfectly assembled new bike. The first service is the chance to make all the small adjustments that will enhance the safety, performance and durability of your new bike.

This is as important as the first oil change on a new car. This first service also gives you the perfect opportunity to ask questions arising from reading the manuals and actually riding your new bike, take steps to fine tune your fit and comfort on the bike, and add accessories to suit your needs.

CLEANING

Use only water and dishwashing liquid.

On suspension forks and shocks, cover adjustment knobs and air filter (if equipped) with a clean plastic bag secured temporarily with a rubber band or masking tape.

Before wiping away dirt, use an ordinary water hose to gently spray off heavy soils and dirt.

CAUTION

DO NOT power wash or spray water under high pressure to clean. Power washing will force contaminants into parts where they will promote corrosion, immediately damage, or result in accelerated wear.

DO NOT use compressed air to dry.

DO NOT use abrasive or harsh chemical cleaner/ solvents which can damage the finish or attack and destroy both the outside and internal parts.

When rinsing, avoid directing the spray directly at shock/fork adjusters or bearings.

PREVENTING CORROSION

After cleaning and drying it is a good idea to lightly coat the water bottle bosses with a water displacing lubricant such as Tri-Flow or WD40 to minimize corrosion from sweat and salt. This is particularly important on bicycles used in coastal salt air environments and those drenched in sweat on an indoor trainer.

To thoroughly clean the frame it is desirable to remove components. This is best done in conjunction with a periodic overhaul by an authorized Cannondale retailer.

PART II

LUBRICATION

After cleaning your bike you should lubricate it. The chain should be lubricated. Consult with your retailer to choose among the many types of chain lubes best suited to your climate and riding conditions. The pivot points on your derailluers should be lubricated. Apply a small drop of oil to each pivot point and wipe off the excess.

Periodically, depending upon how, how often, and where you ride and the design of the components on your bike, other lubrication must be part of your maintenance. Some of you will know how to perform the procedures on this check list, while others will need to take the bike to a dealer. If you are not an experienced and skilled bicycle mechanic, take your bike to a retailer.

Other Lubrication Checklist

	• Derailleur Cables
	• Brake Cables
	• Brake Pivots
	• Headset Bearings
	• Bottom Bracket Bearings
	• Hub Bearings
	• Freehub
	• Seat Post To Seat Tube See page 74.
	• Stem To Steering Tube
	• Headshok or Lefty Suspension Forks (See owner's manual supplement)

TIGHTENING TORQUES

Correct tightening torque for the fasteners (bolts, screws, nuts) on your bicycle is very important to your safety. Correct tightening torque for the fasteners is also important for the durability and performance of your bicycle. We urge you to have your Dealer correctly torque all fasteners using a torque wrench. If you decide to torque fasteners yourself always use a torque wrench.

Find Tightening Torque Information

The wide range of bicycle models and components used means that a listing of tightening torque would be out of date by the time it was published. Many fasteners should be installed with a thread locking adhesive such as Loctite ®.

To determine correct tightening torque and any adhesive application for a fastener we ask you to check:

- Markings on the component. Many components are marked. On-product marking is becoming common.
- Torque specs in the component manufacturers instructions shipped with your bicycle.
- Torque specs listed on the websites of component manufacturers.
- With your Dealer. Dealers have access to current data and have experience with correct torque for most fasteners.

BICYCLE REPAIR / WORK STANDS

The clamping jaws of a bike stand can generate a crushing force strong enough to seriously damage your frame. See next figure.

⚠ CAUTION

Never place your bike in a bike stand by clamping the frame.

Place your bike in a stand by extending the seat post and positioning the stand clamp on the extended seat post. Don't extend beyond the MINIMUM INSERT line marked on the seat post.

Since your carbon seat post can also be damaged by clamping force, adjust the stand clamp for the minimum clamping force needed to secure the bike.

Also, before clamping, clean the post and protect the seat post finish with a rag.

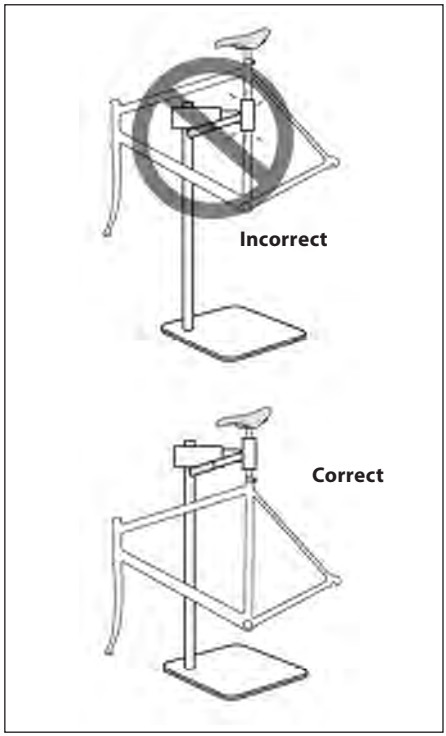


Figure 22.

RIDING THROUGH WATER

⚠ CAUTION

"Sealed" components (such as HeadShok and Lefty forks, headsets, bottom brackets and hubs) are effective at keeping mud and grit out of your bearings.

However, any bike that is submerged or exposed to large amounts of water will require a complete bearing overhaul to prevent extensive—and expensive—damage.

PROTECT CARBON BIKES FROM EXTREME TEMPERATURES

- Protect your carbon bike from extreme temperatures when storing or transporting it.
- Allow your bike to cool off or warm up before you ride
- Do not store your bike in places where the temperature will exceed 66.5C° (150°F).

  For example, do not leave your bike lying flat in a black pickup truck bed in the desert sun, or, under the glass of a hatchback auto.

PART II

APPLYING FRAME PROTECTION

Some areas of your bicycle require protection from abrasion. If protection is not in place, damage can result. Please consult with your Cannondale Dealer about the replacement location and position of these various frame protections.

NOTE: *Damage to your bike resulting cable rub is not covered under your warranty. Make sure the protections indicated below are in place whenever you ride your bike. Ask your Cannondale Dealer for help.*

Housing and Cable Guides

Normal line and cable movement against the frame can wear away painted finishes and decals.

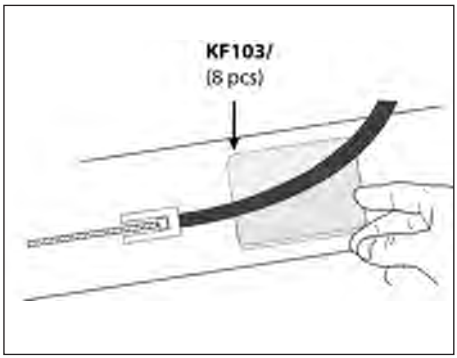


Figure 23.

To apply the guard material :

1. Clean the frame with a mild detergent and wipe dry with a clean towel. Do not use solvents or harsh chemicals to clean the frame. OPTIONAL: Trim the adhesive guard material to the shape required.
2. Remove the backing and position the guard under the cable/ line.
3. Rub the guard firmly against the frame with your fingers to fix it in place.
4. Periodically, recheck the guards and other areas of the frame as you continue to ride. Replace the guards if they wear out.

Also, adhesive frame guards are not a fix for incorrectly installed or routed cables or lines. If you find that applied guards are wearing out very quickly, consult with your Cannondale Dealer about the routing on your bike.

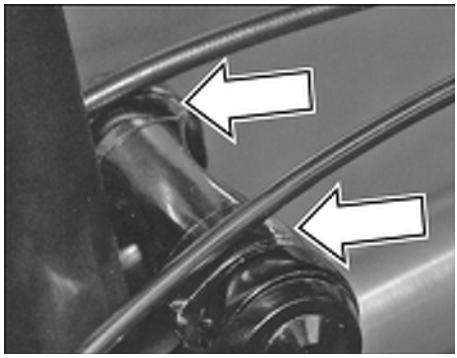


Figure 24.

THIS PHOTO SHOWS A TYPICAL USE OF GUARD MATERIAL AT A CONTACT POINT.

Headtube area

Seattube

Pivots areas

Anywhere a control cable or housing may contact the frame.

⚠ CAUTION

Over time, cable rubbing can wear into the frame itself causing very serious frame damage.

Check over your bike after your first few rides. Apply the guard material where rubbing is found. When applied correctly and renewed when worn, the guard material is good protection for your bike.

Right Chainstay Plate

On mountain or road bikes, the chainstay plate (1) is located on the right chainstay (2) just behind the chainrings (3). This plate protects the carbon (composite) chainstay from damage in the event the chain is dropped from the chainring.

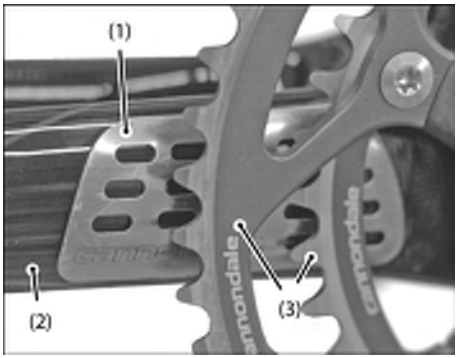


Figure 25.

Downtube Protector

On mountain bikes, placement on the down tube protector (1) on the downtube (2) reduces the potential for damage caused by debris thrown by the wheel.

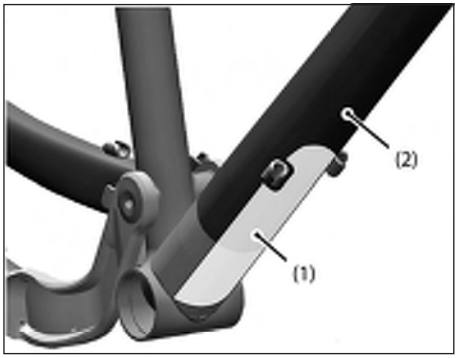


Figure 26.

Chainstay Protector

On mountain or road bikes, the chainstay protector is a clear, adhesive film applied to the upper surface of the right chainstay. This protector can prevent damage to the chainstay caused by the chain.

Figure 27.

On mountain bikes, a wrap-around fabric type protector (1) can be installed as additional protection.

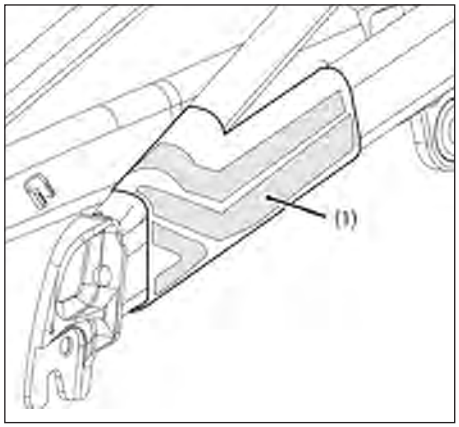


Figure 28.

PART II

SECTION F. CANNONDALE LIMITED WARRANTY

The specific warranty covering your Cannondale bicycle is governed by the law of the state or country in which it was purchased, and applies only to bicycles purchased from Authorized Cannondale Retailers.

FRAMES: (frame, fork structure, swing arm): Cannondale frames (except frames for Freeride, and Dirt Jumping bikes, see below) are warranted by Cycling Sports Group, Inc., 16 Trowbridge Drive, Bethel, CT 06801 against manufacturing defects in materials and/or workmanship for the lifetime of the original owner.

Cannondale frames for Freeride & Dirt Jumping bikes (such as Gemini, Gemini DH, Judge, Perp and Chase) are warranted against manufacturing defects in materials and/or workmanship for a period of three (3) years from the date of original retail purchase. The Freeride / Dirt Jumping warranty does not cover any bike purchased and used for rental purchase. The Freeride / Dirt Jumping warranty differs from the warranty as stated in the Cannondale Owner's Manual only in its term. All other conditions apply.

COMPONENTS: All other components, including HeadShok and Lefty internal parts, suspension parts, frame fixtures and finishes (paint and decals) are warranted against manufacturing defects in materials and/or workmanship for a period of one year from the date of original retail purchase.

Suspension forks (other than those made by Cannondale) are not covered by this limited warranty, but are separately covered by the stated warranty of their manufacturer.

TERMS OF LIMITED WARRANTY:

This limited warranty is not meant to suggest or imply that the bicycle cannot be broken or will last forever. It does mean that the bicycle is covered subject to the terms of the limited warranty.

This limited warranty applies only to the original owner of a Cannondale bicycle and is not transferable to subsequent owners.

For any warranty claim to be considered, the bicycle must be brought in to an Authorized Cannondale Bicycle Retailer on the same continent on which the bicycle was purchased. The bicycle must be in assembled condition and accompanied by the original, dated sales receipt for the bicycle. (Be sure to keep your receipt in a safe place.)

This limited warranty is void if the bicycle is subjected to abuse, neglect, improper repair, improper maintenance, alteration, modification, an accident or other abnormal, excessive, or improper use.

This limited warranty applies only to bicycles purchased in fully assembled and adjusted condition from Authorized Cannondale Retailers or other outlets specifically authorized by Cannondale to distribute Cannondale bicycles.

Damage resulting from normal wear and tear, including the results of fatigue, is not covered. Fatigue damage is a symptom of the frame being worn out through normal use. It is one kind of normal wear and tear, and it is the owner's responsibility to inspect his/her bicycle. See Section 5. and D.

Damage resulting from corrosion is not covered.

Damage resulting from improper assembly or maintenance, or from installation of parts and accessories not compatible with the Cannondale bicycle, is not covered.

All labor charges for warranty service are the responsibility of the bicycle's owner.

During the duration of this limited warranty, CYCLING SPORTS GROUP, INC., will either repair any defective frame or component, or, at our option, replace any defective frame or component with the same or most nearly comparable model or component then available. THIS IS THE EXCLUSIVE REMEDY UNDER THIS WARRANTY. ANY AND ALL OTHER REMEDIES AND DAMAGES THAT MAY OTHERWISE BE APPLICABLE ARE EXCLUDED, INCLUDING, BUT NOT LIMITED TO, INCIDENTAL OR CONSEQUENTIAL DAMAGES OR PUNITIVE DAMAGES.

THIS IS THE ONLY WARRANTY MADE BY CYCLING SPORTS GROUP, INC., ON ITS FRAMES AND COMPONENTS, AND THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION HEREIN. ANY WARRANTIES THAT MAY OTHERWISE BE IMPLIED BY LAW INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, ARE EXCLUDED.

Please refer to the documents included with your bicycle for possible further restrictions.

This Limited Warranty gives the consumer specific legal rights. The consumer may also have other legal rights which vary from state to state or country to country. Some states and countries do not allow the exclusion or limitation of incidental or consequential damages or warranties, so the above limitations or exclusions may not apply to you. If it is determined by a court of competent jurisdiction that a certain provision of this limited warranty does not apply, such determination shall not affect any other provision of this limited warranty and all other provisions shall remain in effect.

WARRANTY REGISTRATION

We encourage you to register your bike with us through one of the options below. Registration helps us ensure your continued satisfaction as well as enabling us to contact you with important product recall safety information at a later time. You have the following options:

1. **MAIL-IN:** (USA Only) You can complete the tear-out cannondale warranty registration postcard in this manual, place a postage stamp on it and drop it in a mailbox.
2. **OUR WESBITE:** You can go to our website and complete the registration information online. Go to http://www.cannondale.com/

PLEASE NOTE THAT YOU MUST HAVE YOUR ORIGINAL PROOF OF PURCHASE (SALES RECEIPT) WHEN PRESENTING A WARRANTY CLAIM. BE SURE TO KEEP IT IN A SAFE PLACE. THE SPECIFIC WARRANTY COVERING YOUR CANNONDALE BICYCLE IS GOVERNED BY THE COUNTRY IN WHICH IT WAS PURCHASED.

We respect your privacy, see http://www.cannondale.com/privacy for details.

SERIAL NUMBER

The serial number for your bike is located on a barcoded label which is attached permanently to the underside of the bottom bracket.

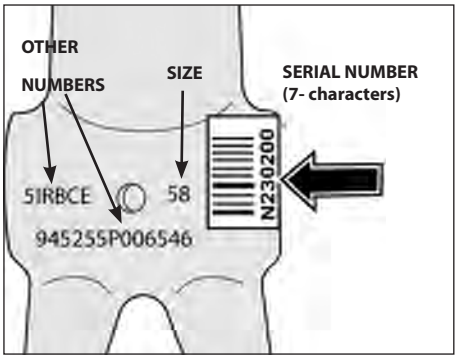


Figure 29. Underside of Bottom Bracket

Where Else Can I Find The Serial Number?

1. The serial number should also appear on your original sales receipt.
2. The serial number is printed on a "Warranty Card" applied to the inside back cover of this manual. Your Cannondale Dealer should have placed the label there. Other numbers important in the manufacture of your bike are printed on this card.

Figure 30. Underside of Bottom Bracket

Other Numbers On The Bottom Bracket

The other number stamped into the bottom bracket in the same area are NOT unique to your bicycle although, they could be helpful to authorities in theft recovery. These numbers are used in our factory.

WARNING

Please register your bike with us. If you don't, we may not be able to contact you directly with important safety recall information.

PART II

CANNONDALE AUTHORIZED DISTRIBUTORS

The following lists are subject to change without notice.

* Denotes Apparel and Accessory Distributor only.

EUROPE (GLOBAL): Cannondale B.V., Postbus 5100, Hanzepoort 27, 7570 GC,Oldenzaal, NL, tel: 0031-541-573580, fax: 0031-541-514240, email: servicedeskeurope@cannondale.com

CROATIA: Keindl Sport, Reljkoviceva 2, 10000 Zagreb, Croatia, tel: 00385-13708323, fax: 00385-13708324, email: keindlsport@inet.hr

CZECH REPUBLIC: Vokolek, Rezlerova 308, 10900, Praha 10, CSK, tel: 00420 241740712, fax: 00420 241740712, email: info@vokolek-import.cz

ESTONIA: Rattapood OU CCC, Rummu tee 3, Tallin 11911, tel: +3726238776, fax +3726237132 email: evald@cosmos.ee

GREECE: Gatsoulis Imports, 8 Thessalonikis street, T.T14342, New Filadelfia Athens, GRD, tel: 0030-2102512779, fax: 0030-2102533960, email: chris@gatsoulis.gr

HUNGARY: Mali Bicycle Technology, Gyepsor Szinesfem u. 22-24., H-1211 Budapest, Hungary, tel: 0036-1420-5032, fax: 0036-142-0532

ICELAND: GA Petursson Ltd., Faxefen 14, 128 Reykjavik, Box 8176, Iceland, IS-108, tel: 354-520-0200, email: mogens@gap.is

LATVIA: FANS Sia "aquapro", Elijas 17-408, Riga, LV1050, tel: 00371-7626025, fax 00371-7892053, email:pauls@aquapro.lv

MALTA: Pedal Power, 56 Triq Is-Stazzjon, B'Kara, BKR 12, Malta, tel: 00356-21227265, fax: 00356 227265

POLAND: PGR Sp. Z.O.O., 15A/39 Literacka St., Warszawa 01-864 tel: +48713431539,

RUSSIA: Sportclub Triatlon, Lusinovskaya Ul 53/12, VELOMIR, 113096, Moscow, RUS, tel: 0070952368278, fax: 007952378463, email: info@velomir.ru

SLOVAKIA: Eximo s.r.o., Trencianska 764/409, 01851 Nova Dubnica, Slovakia, tel: 00421-424430034, fax: 00421424430034, email: eximo@psg.sk

SLOVENIA: Sporttrade 2000, Celovska 280, Ljubljana, 1000, tel: 00386-15104945, fax: 00386-15199580, email: sandi.gabrovsek@siol.net

TURKEY: Delta Bisiklet, 19 Sk. 4a Bahcelievler, Ankara 06490, email: info@deltabisiklet.com, www.deltabisiklet.com

UKRAINE: Velotrade, Enakievskaya 2E, Kharkov, email: maxim_ivanov@velotrade.kharkov.com

MOLDAVIA: Veloservice-Paralax: str. Tighina 52, 2001 Kishinev, email: paralax@velo.md

KAZAKSTAN: Limpopo, 534 Seifallin str, 050022 Almaty email: limpop@nursat.kz

LITHUANIA: Umarai, Ukmerges g 283A, 06313 Wilnius email: pastas@umaras.com

BELARUS: DiscoverySport, 220030 Minsk Kirova St. 23-7, Rep. of Belarus, tel/fax: +375 17 220 23 50, website: www.velo.by email: discoverysport@mail.ru

EUROPEAN DISTRIBUTORS: distributors@cannondale.com, tel: 0041 61 4879387, fax: 0041 61 4879385 0031-541-573587, fax: 0031-541-514240

EUROPEAN TOURISM AND RESORTS: distributors@cannondale.com, tel: 0041 61 4879387, fax: 0041 61 4879385 0031-541-573587, fax: 0031-541-514240

EUROPEAN APPAREL AND ACCESSORIES DEALERS: distributors@cannondale.com, tel: 0041 61 4879387, fax: 0041 61 4879385

INTERNATIONAL SALES: 172 Friendship Village RD, Bedford, PA 15522 USA tel: 814-623-4391, fax: 814-623-2107, international@cannondale.com

ARGENTINA: Lauro Competicion, Avda. San Pedrito 577, Buenos Aires Argentina 01406, tel: 4613-8859, fax: 54-11-4612-8805 Email: laurocompeticion@hotmail.com website: www.cannondaleargentina.com

AUSTRALIA: Cannondale Australia, Unit 6, 4 Prosperity Parade, N.S.W. 2103, Australia, tel: 61-2-9979-5851, cannondaleaustralia@cannondale.com

BERMUDA: The New Winners Edge, 34 Church Street, Hamilton HM11, Bermuda, tel: 441-295-6012, fax: 411-292-1904

BOLIVIA: Visal Import & Export, Avenida Banzer #656, Santa Cruz, Bolivia, tel: (591-3) 341 4141, fax: (591-3) 341 4600

BORNEO: Cannaisa, 101 Frankel Ave., Singapore tel/fax: 65-6441-4772, www.cannasia.com

BRAZIL: Cannondale Brasil, Av. Prof. Sylia Matos, 370, CEP 04182-010 Sao Paulo Brazil Tel:2264-2167/2264-2143 www.cannondale.com.br

BRUNEI: Cannasia, 101 Frankel Ave., Singapore, 458224, tel:65-6441-4772, email: cannasia@mbox5.singnet.com.sg www.cannasia.com

CHILE: Inversiones Intercycles Ltda., Av. Neuva Las Condes, 12.270 #101, Santiago, Chile, South America, tel: 562-215-3470, fax: 562-217-3167, email: cycles@cannondale.cl

CHINA: Kele ShanGu Trading Co. LTD (Shenzhen) F2-28 Arc De Triomphe Str City Valle Shahe West Road 2029 Nanshan Shenzhen PR China tel: 755-267-54695

COLOMBIA: USA Bikes E.U, CRA 43A# 23-50, Medellin, Colombia, tel: 574 262 2820, fax: 574 262 2880 sportbike@epm.net.co

COSTA RICA: Xcesso S.A., San José, Costa Rica, tel: 506-2290-5696, fax: 506-2290-3412, xcesso@racsa.co.cr

DOMINICAN REPUBLIC: Aro & Pedal, 27 de Febrero #112, Santo Domingo, Dominican Republic, tel: (809) 686-5861, fax: (809) 687-6548, email: aro.pedal2@codetel.net.do

ECUADOR: X-Bikes, Shirys N41-206 e Isla Floreana, Quito Ecuador tel: 593-99-217050 fax: 593+22-440312

EL SALVADOR: Grupo Extremo, Blvd Santa Elena Atrium Plata 5y6 Antiquo Cuscattan San Salvador, El Salvador tel: 502-228-99636

GUAM: Hornet Bicycles, PO Box 8294, Tamuning, Guam 96931, tel: 671-646-9191, fax: 671-646-1900, email: hikko@guamcell.net

GUATEMALA: Bike Center, S. A., 20 Calle 24-67 Zona 10, Paris Plaza, Local 2-3, Guatemala City Guatemala, tel: 502-333-4388, fax:502-333-7394, email:bikecenter@intelnett.com

HONDURAS: Hondubikes, Col.Humuya Av.Sabana Tegucigalpa, Honduras , tel: & fax: 504-239-2192

HONG KONG: Flying Ball Bicycle, 478 Castle Peak Road, Cheung Sha Wan, Hong Kong, tel: 852-238-13661, fax: 852-239-74406, www.flyingball.com

INDIA: Tube Investments of India, PO Box 5, MTH Rd Ambattur, Chennai 60053, India, tel: 914 428 553492, fax: 914 428 553757

INDONESIA: Cannasia Pte. Ltd., 101 Frankel Ave., Singapore, 458224, tel: 65-6441-4772, email: cannasia@mbox5.singnet.com.sg, www.cannasia.com

ISRAEL: DAA Sport Marketing LP, PO Box 6035, Netanya, Israel, 42160, tel: 972-(0)9-865-6960, fax: 972-(0)9-885-0144, web.daa.co.ildan@daa.co.il

JAMAICA: Hi Tech Industries LTD., 8 Dumfries Road Kingston 10 Jamaica W. Indies, tel: 876 855 8888 , fax: 876 978 7414

JAPAN: Cannondale Japan, 5-12-5, Harayamadai, Sakai City, Osaka, Japan, 590-0132, tel: 072-299-9399, cjcustserv@cannondale.com

KAZAKASTAN: Doctor Can, 158 Makataeva Street, 61 app, Rep. Of Kazakhstan, 480090, tel: 7 3272 338943

KOREA: Sanbada Sports, #402, Doohyun Bldg, 233 Nonhyun-dong, Kangnam-Gu, Seoul, Korea, tel: 822-543-6390, fax: 822-3442-6391, email: sanbada1@unitel.co.kr

KUWAIT: Silicon Valley Group, Cannondale Store, Shuwaikh Industrial Area, Kuwait City, Kuwait Tel: 965-482-6723 Email: svg@qualitynet.net

LEBANON: VO2 MAX, Asco Center, Sassine, Beirut, Lebanon, tel: 961-132-6111, fax: 961-132-8666, www.vo2maxlb.com

MALAYSIA: Cannasia Pte. Ltd., 101 Frankel Avenue, Singapore, 458224, tel: 65-6441-4772, cannasia@singnet.com.sg & www.cannasia.com

MAURITIUS: Emcar Ltd, Old Moka Road , Bell Village, Republic of Mauritius, tel: 230-208-6335, fax: (230) 212-5952

MEXICO: Viansi Triathlon Boutique, Av. Division Del Norte #2957, Col. Rosedal Coyoacan, Mexico 04330, D.F., tel: 525-5549-5291, fax: 525-549-5291, viansi_bici@infosel.net.mx

NETHERLAND ANTILLIES: Tri-Sport N.V., #14B Airport Blvd Simpsonbay, St. Maarten, Netherlands Antilles, tel: (599)545-4385, fax: (599)545-4384, trisport@sintmaarten.net

NEW CALEDONIA: Royal Motors SA., 9, route de la Baie des Dames B.P. 2548, Nouméa, New-Caledonia, 98846, tel: 687 285 912, fax: 687 286 320, r.motors@groupedang.nc

PANAMA: Distrubuidora Rali, Via Tocumen, Apartado 87-052, Zona 7, Panama, tel: 507-220-3844, fax: 507-220-5303, disrali@sinfo.net

PERU: Cycling S.R.L., Av. Tomas Marsano 2851, Higuereta-Surco, Lima, Peru, tel/fax: 511-271-0247, cycling@terra.com.pe

PHILIPPINES: Newton Multi-Sales, 71 Kundiman, Cor. llagan St., SFDM, Quezon City, Philippines, 1105, tel: (0632)3725127-28 & 3717231, fax: (0632) 3735439, wash@pacific.net.ph

PUERTO RICO: Seamount Corporation, Marginal Borie, Edificio 1500 Local #4., San Juan, Puerto Rico, 00926, tel: 1-787-763-4369, fax: 1-787-765-6520, info@ciclomundo.com

PUERTO RICO: TL Bicycle Distributor Inc, Jose A. Lugo, Edif. Mar de Isla Verde Apt 10-Q, San Juan Puerto Rico, 00979, tel: 787 613 1040,

SINGAPORE: Cannasia Pte. Ltd., 101 Frankel Avenue, Singapore 458224, tel: 65-6441-4772, Cannasia@singnet.com.sg, www.cannasia.com

SOUTH AFRICA: Cape Cycle Systems (PTY) Ltd., 10 Argo Road, Wetton, South Africa, 7808, tel: 27-21-761 3528, fax: 27-21-761 5914, capecycles@intekom.co.za

TAIWAN: Three Peaks Bicycle Company, No. 222 Jin-Xian 8th Rd, Taichung Taiwan, Phone# 886-424-368842, www.threepeaks.com.tw

THAILAND: Cycoholic 45/39 Soi Atthakrawee 1, Sukhumvit 26 Road (Soi Aree) Bangkok, Thailand 10110 tel:+66815678886 thaicann@cannasia.com www.thaicannasia.com

TRINIDAD: Motorcycles Etc., 89 Eastern Main Road, Barataria, Trinidad and Tobago, tel: 868-675-2453, fax: 868-675-3816, larrya@wow.net

TRINIDAD: Sports & Games 47 Tissue Drive Trincity, Trinidad Tel: 868-640-2507 Fax: 868-640-0505

UNITED ARAB EMRIATES: Prozone P.O. Box # 123500 Dubai (United Arab Emirates) Phone: +9714 33-88644 Fax: +009714 3385552 E-mail: Info@prozoneltd.com Website: www.dubaicycles.com

URUGUAY: Motociclo SA, AV Sayago 1385-CP 12400, Montevideo, Uruguay, phone: 5982 354 20 80

VENEZUELA: Bici Bikes, 2A AV., Ed. Artelito local 5 (WINDCTR) Los Palos Grandes, Caracas, Venezuela 1041, tel: 58-212-286-0285; fax: 58-212-283-7466

VENEZUELA: Bicimania C.A., C.C., M Ave. Bolivar, Porlamar, Margaritia Island, Venezuela, tel: 58-295-262-9116, fax: 58-295-262-9116, bicimania@cantv.net

VENEZUELA: Bike Sports/Venezuela-Centro Comercial Ibarra, Local 3A, Calle Garcilazo, Colinas de Bello Monte, Caracas, Venezuela, tel: 58-212-751-9730, fax: 58 212 753 5071

WORLD WIDE MILITARY SALES: tel: 814 623 4391; fax: 814 623 2107, international@cannondale.com

WORLD WIDE TOURISM & RESORTS: tel: 814 623 4391; fax: 814 623 2107, international@cannondale.com

(10/09)

PART II

APPENDIX A

Cannondale BB30 Standard Bicycle Frames

Certain Cannondale bicycle frames are manufactured using the BB30 standard. See http://www.BB30standard.com/. It may be possible to convert a BB30 frame for use with standard English/68mm or 73mm bottom bracket cranksets using the appropriate Cannondale frame adapter. Other adapters, ones not specifically approved for use by Cannondale may void your warranty.

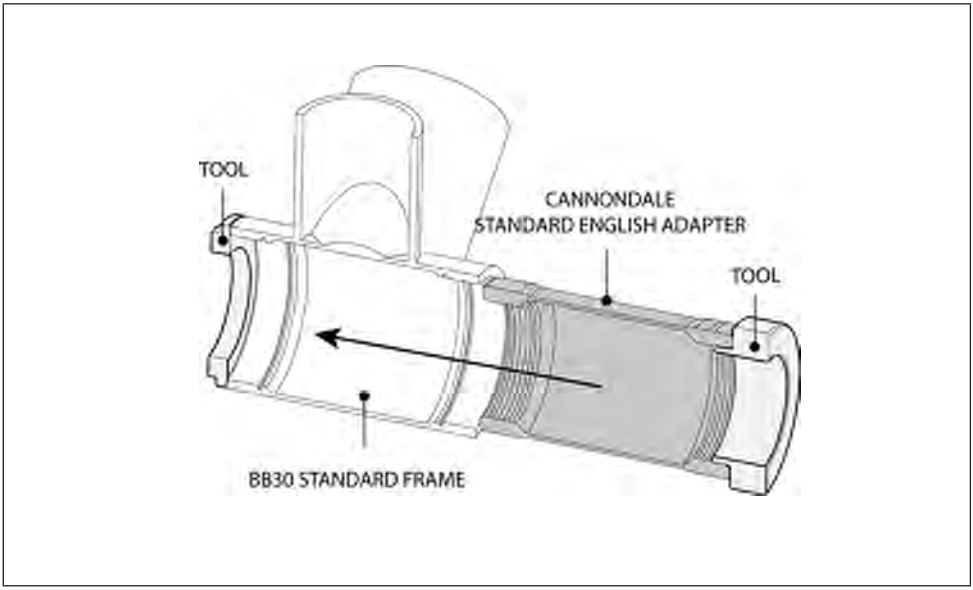


Figure 31. BB30 Bottom Bracket Shell

⚠ CAUTION

All Adapters must be installed by a professional bike mechanic. No adapter should be used as a frame repair part. Adapters should only be used in undamaged frames in good condition. Improper installation or removal can result in damage and void applicable frame warranty.

The adapter is removable, however, repeated removal and reinstallation could result in damage to the SI BB shell and is not recommended. Damage caused by improper removal is not covered under your warranty.

APPENDIX B

Maximum Fork Length (Mountain Bikes)

Maximum Fork Length is an important frame safety testing specification for front suspension mountain bikes. You must observe the measurement when installing headset parts, headset adapters, installing and adjusting a fork, and selecting replacement forks.

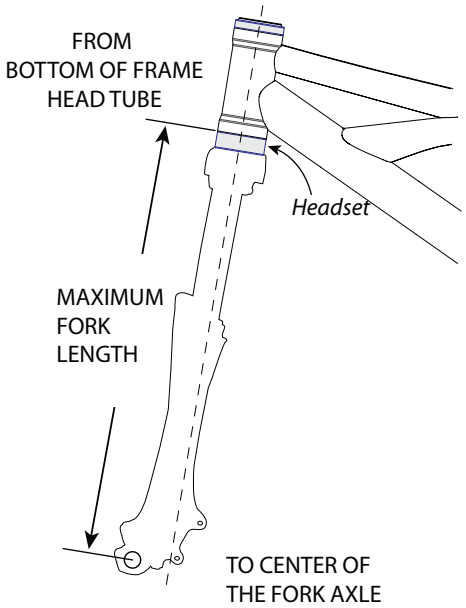
⚠ WARNING

YOU MUST SELECT A REPLACEMENT FORK NOT ONLY BASED ON HEAD TUBE DIAMETER BUT THE CRITICAL FACTOR OF FRAME MAXIMUM FORK LENGTH

DO NOT EXCEED MAXIMUM FORK LENGTH Exceeding the MAXIMUM FORK LENGTH limit can overload the frame causing it to break)while riding.

Your retailer MUST follow observe this specification for your bike. For Maximum Fork Length specifications for Cannondale bicycles, see http://www.cannondale.com/tech_center/

YOU CAN BE SEVERELY INJURED, PARALYZED OR KILLED IN AN ACCIDENT IF YOU IGNORE THIS WARNING.



PART II

APPENDIX C

Care And Maintenance Of Carbon Fiber Seat Posts

Inserting the Seat Post

Check the seat tube (1) opening , and slot (2) carefully for sharp edges or burrs. Anything that can scratch, score, gouge, or cut the seat post can cause serious damage leading to breakage of the seat post. Sharp edges or burrs can be removed by hand by lightly sanding with a very fine sandpaper (400 grit). The should feel very smooth without jagged edges or nicks.

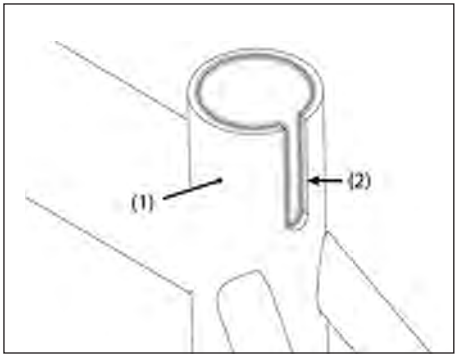


Figure 32.

1. Make sure the seat post, seat binder, and seat tube are clean.
2. **Apply small amount of a carbon seat post gel (Cannondale part number *KF115/* to seat post surface. The gel adds desirable friction and minimizes corossion. It will help keep your seat post in place.**
3 Position the seat binder on the seat tube with the binder slot (A) opposite the seat tube slot (b). Locating the binder slot opposite the seat tube slot reduces the chances of cracking from deformation or accidental overtightening.
4. Insert the seat post and tighten the seat binder to the specified torque with an accurate torque wrench. Consult the seat post manufacturer's instructions for torque information.
5. Check tightening torques of the saddle to seat post clamp bolts. Too much torque may break the bolts. Too little torque will result in movement which leads to fatigue and bolt breakage.

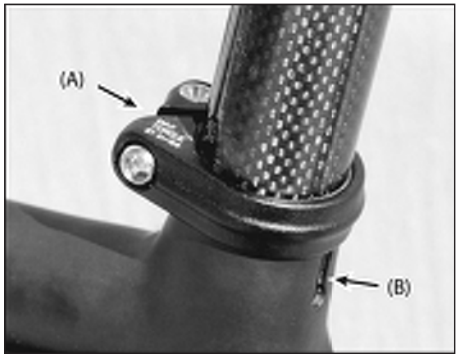


Figure 33.

Periodic Seat Post Inspection

Frequent seat post checks are necessary to identify the problems that can lead to an accident. Regularly or in conjunction with your regular bike maintenance routine, do the following:

1. Remove the seat binder from the frame seat post. Clean the binder, the seat post, and inside the seat tube. Use a clean dry towel. Do not use solvents.
2 Carefully inspect the seat post for damage (e.g., cracks, scratches, scrapes, gouges, splintering). If the seat post is damaged in any way, (cracks, scratches, scrapes, gouges, splintering), do not ride it; discard it. Replace it with a new one.
3. Always properly torque saddle to seat post clamp bolts. Too much torque may break the bolts. Too little torque will result in movement which leads to fatigue and bolt breakage.

⚠ WARNINGS

TO AVOID SEAT POST OR FRAME DAMAGE:

1. **FOLLOW THE SEAT POST MANUFACTURER'S INSTRUCTIONS** If you do not have the manufacturer's instructions for your seat post, obtain and read them before using the seat post.

2. **INSPECT AFTER ANY CRASH, FALL, OR IMPACT** - Remove and inspect the seat post for damage (eg., cracks, scratches, scrapes, gouges, splintering). If you find damage, replace it with a new one. **STOP RIDING A DAMAGED SEAT POST IMMEDIATELY** GO TO PART II, Section D. Inspect For Safety. Read "Understanding Composites" for information on carbon fiber

3. **NEVER FORCE A SEAT POST INTO THE SEAT TUBE.** The seat post should always be a slide fit. If the seat post is difficult to install, there is a serious problem. Do not shorten or cut a seat post. Ask your Cannondale dealer for help in properly fitting and adjusting your seat post.

4. **KEEP THE SEAT POST'S "MINIMUM INSERT" BELOW THE TOP OF THE SEAT TUBE.**

5. **USE A TORQUE WRENCH TO TIGHTEN SEAT POST BINDER AND ALL SADDLE MOUNTING FASTENERS.**

6. **NEVER USE LIGHT OR SPRAY OILS TO LUBRICATE A SEAT POST OR INSIDE THE SEAT TUBE.** Never use solvents, or chemical spray cleaners to clean the inside of the seat tube. Wipe out the seat tube with a clean dry towel only. Light oils (WD40 and oils typically used in honing) and solvents, and including chemical cleaners can attack and weaken composite bonds holding the frame together leading to breakage. Follow the seat post and frame manufacturer instructions. See also page 74.

YOU CAN BE SEVERELY INJURED, PARALYZED OR KILLED IF YOUR IGNORE THESE WARNINGS.

PART II

APPENDIX D

Care And Maintenance Of Carbon Fiber Forks & Stem

⚠ WARNINGS

ALWAYS SEEK PROFESSIONAL SERVICE

Incorrectly installing, adjusting, servicing, or assembling the wrong parts (handlebar stem, compression assembly, brake bolt, spacers and spacer positions) on your bicycle fork can cause serious damage to it. Any failure in the fork, headset, handlebar stem, or compression assembly while riding can cause you to have a serious accident. All adjustments, maintenance, and any changes must be made by your Cannondale Dealer.

STOP RIDING A DAMAGED FORK & STEM IMMEDIATELY **Your fork can be seriously damaged in any crash or impact.** Damage can be concealed and requires very carefully inspection by a professional bike mechanic.

A damaged fork and/or handlebar stem can fail without warning. Go to PART II, Section D. Inspect For Safety. Read "Understanding Composites" for information on carbon fiber

REPLACE THE FORK WITH A NEW ONE IF THE DROPOUT TABS ARE MISSING OR DAMAGED. The dropout tabs located at the bottom of the fork dropout act as a secondary wheel retention device and can reduce the risk of the wheel disengaging from the fork if the quick release is not correctly adjusted and closed. It is possible for the tabs to become worn out or damaged through repeated wheel installation and removal, car rack use, etc.

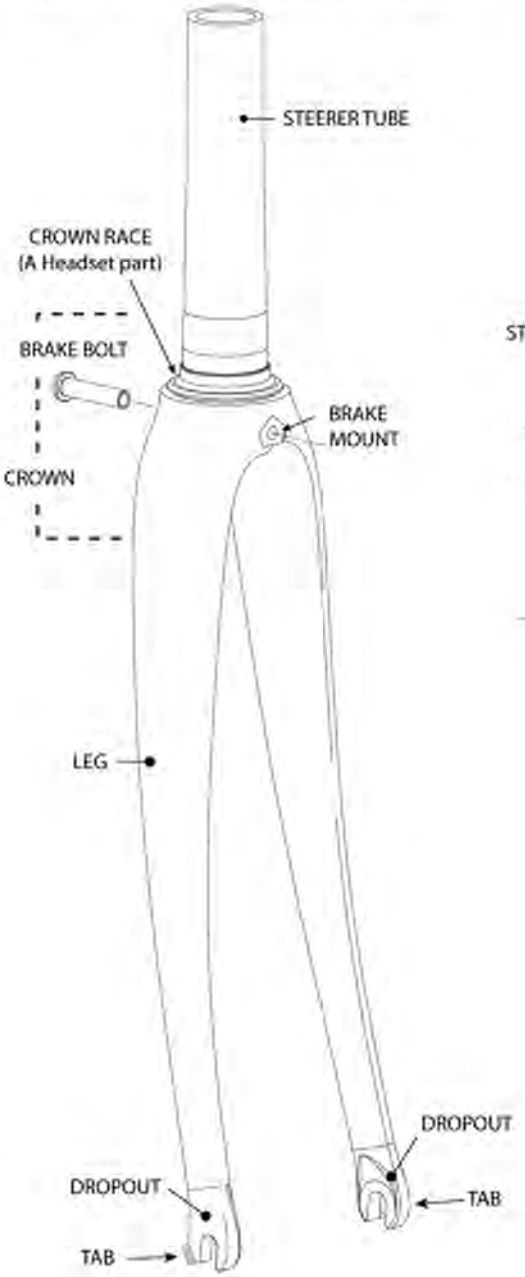
DO NOT MODIFY THE FORK IN ANY WAY. Do not drill holes or install mechanical clamps.

DO NOT EXCEED THE MAXIMUM STACK HEIGHT OR LOCATE SPACERS ON TOP OF THE STEM. MAXIMUM STACK HEIGHT is a distance spacers may be stacked between the top of the head tube and the bottom of the stem. Exceeding this distance with spacers or locating spacers on top of the handlebar stem can place significant stress on the steerer tube. It could break.

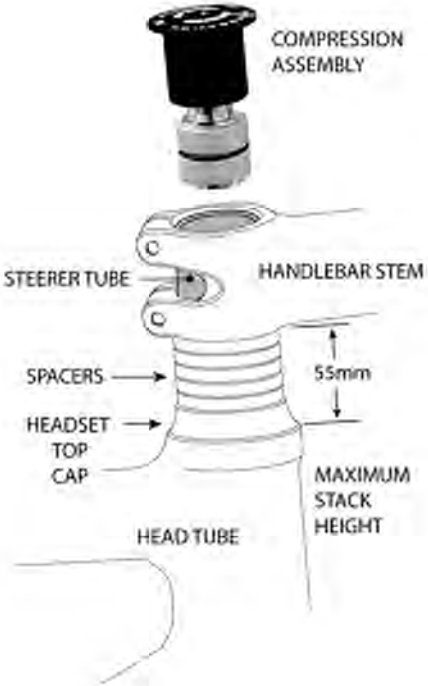
For technical information and specifications, see http://www.cannondale.com/tech_center/

YOU CAN BE SEVERELY INJURED, PARALYZED OR KILLED IN AN ACCIDENT IF YOU IGNORE THESE WARNINGS.

PARTS OF A TYPICAL CARBON ROAD FORK



PARTS OF A TYPICAL ROAD STEM



NOTE: Carbon fiber bicycle forks and stems come in many different shapes. The basic parts common to most carbon forks and handlebar stem systems are shown here.

Your fork appearance and shape may vary from what is shown.

If you have any questions about your fork, ask your Cannondale Dealer.

NOTE: DROPOUTS, STEERER, and HANDLEBAR STEM can be made from carbon fiber, metals or both in a "carbon fiber" fork.

FIGURE 34

PART II

APPENDIX E

BICYCLE RACKS

Bicycle automobile racks are available from many different manufacturers and many different rack designs exist. They are convenient devices to transport your bike. However, any bicycle rack has the potential to seriously damage your bicycle. Damage can occur immediately due to some aspect of an incompatible or poor rack design. Damage can occur after repeated mounting, and dis-mounting. Damage can also happen while the the bike is being transported in the rack. We can't cover all the possible ways in which a rack can cause damage to your bike.

⚠ WARNING

READ AND FOLLOW THE RACK MANUFACTURER'S INSTRUCTIONS BEFORE MOUNTING YOUR BIKE.

Both carbon and aluminum frames and forks can be damaged (crushed, cracked, or dented) by the clamps and support systems of a bike rack. Both carbon and aluminum can suffer serious abrasion damage by the movement of the bike in the rack during transport. All damage to your bike is very serious, that is why you must take extra care when choosing a bike rack and when actually mounting your bike in the rack.

WHEN MOUNTING YOUR BIKE ON A RACK

Remove all bags, panniers, water bottles etc. To minimize wind resistance, loading, and avoid chafing damage.

ASK YOUR CANNONDALE DEALER FOR HELP CHOOSING AND USING A BIKE RACK.

See the table on the following page for more rack information.

⚠ CAUTION

WHEN USING A RACK WITH FORK DROPOUT CLAMPS

Make sure that both fork dropouts are engaged in the rack before clamping. Make sure both dropouts are clamped with equal force. If only one dropout is engaged and the bike tips over, the leverage can exert great force that may damage the dropout. If your bike tips over, have the dropouts examined by a retailer.

TYPE OF RACK DESIGN	RECOMMENDATION & CAUTIONS
CLAMPS ON TIRES / WHEELS ONLY This type does not use clamps on any other part of the frame or fork.	**Suitable for both carbon and aluminum frames** This is the best system design because there is no potential cracking or crushing damage to the frame or fork. Chafing wear is avoided.
FLOATING FORK MOUNT & REAR WHEEL TRAY This design functions exactly as a quick release on your bike. The rear wheel is clamped in a tray. No other clamps are used on any other part of the frame.	**Suitable for both carbon and aluminum frames** Be sure quick release on rack is properly adjusted and tightly closed. The Thule Echelon with ETC Equalized Twin Cam is suitable as it has an axle floating mechanism, like a standard quick release.
WHEEL CLAMPS & UPRIGHT ARM CLAMP In this design, wheels are clamped in a wheel tray and the bicycle is held upright by and arm clamping the downtube.	**Do not use on bikes with carbon fiber downtubes.** When clamp is tightened the carbon downtube can be broken. When clamp is looser, chafing can cause structural wear. A loose clamp can allow movement and possible chafing damage. Clean the clamping area to eliminate abrasive particles, pad the clamping area and properly tighten the clamp.
NON-FLOATING FORK MOUNT & REAR WHEEL TRAY With this type, a mechanism pulls the two sides of the fork in at the same time, and pulls both sides in the same distance. example: Thule Peloton.	**Not recommended for either carbon or aluminum bikes.** If one dropout is slightly thicker than the other dropout, all the clamping force is applied to the thicker dropout. The high force on the one thicker dropout may crack a carbon dropout. The thinner dropout may move in the rack causing wear and abrasion, The fork blade attached to the thicker dropout takes most of the loads caused by 70 mile per hour wind and bumps. The result may be damage to your fork.
HANGER RACK On this type the bicycle hangs on two arms projecting aft from a trunk mounted rack	**Not recommended for either carbon or aluminum bikes.** **Do not use on bikes with carbon fiber tubes.** The point loading where the arms contact the underside of the tubes may crack the tubes. Additionally the lower part of the bike is difficult to secure, and it may move, causing chafing and structural wear. Additionally when two bikes are mounted on these racks the contact points between the bikes may be cracked or chafed, causing structural damage.

PART II

APPENDIX F

BICYCLE TRAINERS

Potential Damage

CAUTION

Improperly mounting a bike in a trainer, or using one that is not compatible with your particular bike frame can cause serious damage.

This kind of damage is not covered by the *Cannondale Limited Warranty.*

Ask you dealer for help with trainers, the right one and the correct way to use it.

If you ride a trainer that requires removal of the front wheel and clamps the fork dropouts: Be sure your fork quick release is tight! Relative movement will wear parts, weaken and damage your bike.

If you ride a trainer that holds the bike up by clamping the rear quick release between two cones: Take off the nice, lightweight quick release that came with your bike. Substitute a heavy, classic all steel quick release and clamp it tight! Relative movement will wear parts, weaken and damage your bike. Note that many modern quick releases will not fit the clamping cones in this kind of trainer because their shapes are incompatible.

Be particularly cautious with a carbon frame or fork. Carbon is relatively soft, not abrasion resistant. If there is any relative movement, carbon will wear quickly.

If you ride a trainer a lot, consider using an old bike: Corrosion from sweat will take it's toll. Weight is irrelevant. Save wear on your expensive components.

Risk To Children

WARNING

KEEP CHILDREN AWAY FROM BICYCLES MOUNTED ON STATIONARY TRAINERS, EVEN WHEN THE BICYCLE IS NOT IN USE.

Spinning wheels attract children's attention and present a serious risk to young fingers.

Children have also been known to rotate cranks by hand on bicycles left unattended on stationary trainers, putting themselves at risk of serious injury.

SECTION G.
PRE-RIDE CHECKLIST

⚠ WARNING

FOLLOW THIS CHECKLIST BEFORE EVERY RIDE. IF YOU HAVE ANY REASON TO SUSPECT THAT YOUR BICYCLE IS NOT FUNCTIONING PROPERLY, DO NOT RIDE IT.

Have it inspected by an Authorized Cannondale Retailer. To locate your nearest Authorized Cannondale Retailer call 1-800-BIKE-USA. Failure to follow this checklist and to have any potential problem inspected could lead to an accident, with risk of serious injury, paralysis or death.

Are you wearing a helmet and other appropriate equipment and clothing, such as protective glasses and gloves? Do not wear loose clothing that could become entangled in the bicycle (See PART I, Section 2.A The Basics).

Are your seatpost and stem securely fastened? Twist the handlebars firmly from side to side while holding the front wheel between your knees. The stem must not move in the steering tube. Similarly, the seatpost must be secure in the seat tube (See PART I, Section 3. Fit).

Are you visible to motorists? If you are riding at dusk, dawn or at night, you must make yourself visible to motorists. Use front and rear lights and a strobe or blinker. Reflectors alone do not provide adequate visibility. Wear reflective clothing (See PART I, Section 2.E Night Riding and PART II, A. Important Safety Information).

Is it raining or wet? If so, be more cautious. Your braking distances will increase, and your tires' grip on the road will decrease. Remember that motorists' visibility decreases with bad weather (See PART I, Section 2.D Wet Weather Riding and PART II, A. Important Safety Information)

Are your tires properly inflated? Tires must inflated to the recommended pressure. (See PART I, Section 4.G Tires and Tubes).

Are your wheels true? Lift each end of the bike and spin each wheel. Does the space between the rim and the brake pads, or the tire and the frame, remain nearly the same size as the wheel turns? Are your spokes tight? (See PART I, Section 1.C Mechanical Safety Check).

Are your wheels' quick-releases properly fastened? Be sure to read the section on proper operation of quick-release skewers (See PART I, Section 4.A Wheels).

PART II

Are your front and rear brakes functioning properly? With V-brakes, the quick release "noodle" must be properly installed. With cantilever brakes, the quick release straddle cable must be properly attached. With caliper brakes the quick release lever must be closed. With any rim brake, the brake pads must make firm contact with the rim without the brake levers hitting the handlebar grip (See PART I, Section 4.C Brakes).

With hydraulic disc brakes, check that the lever feels firm, does not move too close to the handlebar grip, and there is no evidence of leaking brake fluid. With cable actuated disc brakes, check that the lever feels firm and does not move too close to the handlebar grip. With any disc brakes, the brake pads must make firm contact with the rotor without the brake levers hitting the handlebar grip (See PART I, Section 4.C Brakes).

How do your clipless pedals work today? Clip in and out of your pedals before you begin. Experienced cyclists do. The connection between cleat and pedal is affected by dozens of factors including dirt, mud, lubrication, spring tension and wear. By clipping in and out you will check the function and have a fresh memory of how they feel (See PART I, Section 4.E Pedals).

How recently were your frame, fork and components inspected? Never ride a frame, fork or components with any crack or damage. (See PART II, - Section D. Inspect For Safety)

CANNONDALE WARRANTY REGISTRATION

Please register your bicycle so that we are able to contact you regarding any safety issues such as technical service bulletins or recalls. Complete this mail-in card, or register your bike online at http://www.cannondale.com/warrantyregistration. Additionally, prompt registration will insure that your serial number is recorded if your bike is stolen or if you require warranty service.

Mr. ❑ Mrs. ❑ Ms. ❑ Miss ❑

1. First Name | Initial | Last Name

Address: (Number and Street) | Apt. #

City | State | Zip

2. **Marital Status:** Married ❑ Single ❑

3. **E-Mail:**

4. **Phone Number:**

5. **Date of Purchase:** Month Day Year

6. **Purchase Price:** $ .00

7. **Bike Model:**
Example: R5000 or Scalpel 1000

PLEASE REMEMBER:
You must present your original sales receipt at the time you request warranty service. Keep it in a safe place.

8. **Dealer Name:**

9. **BIKE SERIAL NUMBER:**

YOUR BIKE'S SERIAL NUMBER IS PRINTED ON THE 7-CHARACTER BARCODED LABEL ON THE UNDERSIDE OF THE BOTTOM BRACKET

10. **What are the top three (3) features influencing your purchase?**

1.❑ Received as a Gift	6.❑ Component Selection	11.❑ Design/Materials
2.❑ Value for Price	7.❑ Comfort/Fit	12.❑Friend/Family
3.❑ Color/Appearance	8.❑Weight of Bicycle	13.❑ Salesperson
4.❑ Repeat Customer	9.❑ Cannondale Reputation	14.❑ Cannondale Website
5.❑ Quality/Durability	10.❑Advertisement	15. ❑ Test Ride Truck

11. **How many times do you ride per month?**
1. ❑ 1-5 2. ❑ 6-10 3. ❑ 11-15 4.❑ 15+

12. **What type of cycling do you do most often? (Check one)**

1.❑ Mountain XC	4.❑ Touring	7. ❑ Recreational
2.❑ Mountain DH/FR	5.❑ Road Racing	8 . ❑ Triathalon
3.❑ Marathon	6.❑Commuting/Work	9. ❑ Recreational

13. **Date of Your Birth:** Month Day Year

14. **Favorite cycling club or group contact information and/or website information?**

15. **What magazines do you regularly read, (Check all that apply)**

1.❑ Bike	7. ❑ Mountain Biking	13. ❑ Pro Cycling
2.❑ Mountain Bike	8. ❑ Shape	14. ❑ Outside
3.❑ Mt. Bike Action	9. ❑ Bicycling	15. ❑ Men's Journal
4.❑ Dirt Rag	10. ❑ Road	16. ❑ Dandelion
5.❑ Decline	11. ❑ Velonews	17. ❑ Men's Health
6.❑ Adventure Sports	12. ❑ Cycle Sport	

Thank you for filling out this questionnaire. We value your answers and input. Please check here ❑ if you would prefer not to participate in further market research or obtain information on new and interesting opportunities from other exciting companies.
We respect your privacy, see **http://www.cannondale.com/privacy** for details.

02/09

RISK FREE OFFER

Register your Cannondale bike today, and as our way of saying "thanks," we'll send you 2 RISK-FREE trial issues of BICYCLING Magazine.

[ ] YES! Send me a two issue, risk-free trial subscription to BICYCLING Magazine. If I like what I see, I'll pay just $16.97 (plus $2.97 for delivery) for 9 more issues. PLUS – as an added bonus, my subscription will also include the next year of MOUNTAIN BIKE, absolutely FREE!

If I choose not to subscribe, I'll simply write "cancel" on the invoice and owe nothing. No matter what, the 2 RISK-FREE trial issues are mine to keep – compliments of CANNONDALE!

Bicycling

cannondale

R0204

FOLD HERE AND TAPE CLOSED BEFORE MAILING

Please do not send products or other correspondence to this address.

FIRST CLASS POSTAGE REQUIRED

cannondale

Product Registration Department
PO Box 1452
Bellmawr, NJ 08099 USA

WARRANTY CARD LABEL

The space below is reserved for your bike's "Warranty Card." It is a peel-off label, attached to a hangtag on every frame or frameset we ship (placed here by your Cannondale Dealer).

The "Warranty Card" includes a variety of printed product information numbers. The bike serial number is one of them. You'll use the serial number when you register your warranty The serial number should match the barcode label located on the underside of your bike's bottom bracket. The other numbers on the card can be helpful later in the event of a product recall or other important safety information.

Please Note: The actual numbers printed on your warranty card may not be arranged in the format depicted in the example.

UPC:
PRODUCT CODE:
SERIAL NUMBER:
10/11/00 11:05 FSO: 123456
WARRANTY CARD
Garantiekarte / Carte de Garantie / Tarjeta de Garantia / Tagliando di Garanzia / 保証登録
Registrate / Registratevi / Enregistrez-vous / Registrieren Sie sich / 登録
REGISTER AT: www.cannondale.com
REMOVE FROM BIKE AND STICK IN BACK COVER OF OWNER'S MANUAL

PRE-RIDE CHECKLIST

⚠ WARNING

FOLLOW THIS CHECKLIST BEFORE EVERY RIDE. IF YOU HAVE ANY REASON TO SUSPECT THAT YOUR BICYCLE IS NOT FUNCTIONING PROPERLY, DO NOT RIDE IT. Have it inspected by an Authorized Cannondale Retailer. To locate your nearest Authorized Cannondale Retailer call the 1-800-BIKE-USA. Failure to follow this checklist and to have any potential problem inspected could lead to an accident, with risk of serious injury, paralysis or death.

Are you wearing a helmet and other appropriate equipment and clothing, such as protective glasses and gloves? Do not wear loose clothing that could become entangled in the bicycle (See PART I, *Section 2.A The Basics*).

Are your seatpost and stem securely fastened? Twist the handlebars firmly from side to side while holding the front wheel between your knees. The stem must not move in the steering tube. Similarly, the seatpost must be secure in the seat tube (See PART I, *Section 3. Fit*).

Are you visible to motorists? If you are riding at dusk, dawn or at night, you must make yourself visible to motorists. Use front and rear lights and a strobe or blinker. Reflectors alone do not provide adequate visibility. Wear reflective clothing (See PART I, *Section 2.E Night Riding* and PART II, *A. Important Safety Information*).

Is it raining or wet? If so, be more cautious. Your braking distances will increase, and your tires' grip on the road will decrease. Remember that motorists' visibility decreases with bad weather (See PART I, *Section 2.D Wet Weather Riding* and PART II, *A. Important Safety Information*).

Are your tires properly inflated? Tires must inflated to the recommended pressure. (See PART I, *Section 4.G Tires and Tubes*).

Are your wheels true? Lift each end of the bike and spin each wheel. Does the space between the rim and the brake pads, or the tire and the frame, remain nearly the same size as the wheel turns? Are your spokes tight? (See PART I, *Section 1.C Mechanical Safety Check*).

Are your wheels' quick-releases properly fastened? Be sure to read the section on proper operation of quick-release skewers (See PART I, *Section 4.A Wheels*).

Are your front and rear brakes functioning properly? With V-brakes, the quick release "noodle" must be properly installed. With cantilever brakes, the quick release straddle cable must be properly attached. With caliper brakes the quick release lever must be closed. With any rim brake, the brake pads must make firm contact with the rim without the brake levers hitting the handlebar grip (See PART I, *Section 4.C Brakes*).

With hydraulic disc brakes, check that the lever feels firm, does not move too close to the handlebar grip, and there is no evidence of leaking brake fluid. With cable actuated disc brakes, check that the lever feels firm and does not move too close to the handlebar grip. With any disc brakes, the brake pads must make firm contact with the rotor without the brake levers hitting the handlebar grip (See PART I, *Section 4.C Brakes*).

How do your clipless pedals work today? Clip in and out of your pedals before you begin. Experienced cyclists do. The connection between cleat and pedal is affected by dozens of factors including dirt, mud, lubrication, spring tension and wear. By clipping in and out you will check the function and have a fresh memory of how they feel (See PART I, *Section 4.E Pedals*).

How recently were your frame, fork and components inspected? Never ride a frame, fork or components with any crack or damage. (See PART II, *Section D. Inspect For Safety*).

CANNONDALE USA
Cycling Sports Group, Inc.
172 Friendship Road, Bedford,
Pennsylvania, 15522-6600, USA
(Voice): 1-800-BIKE-USA
(Fax): 814-623-6173
(Email): custserv@cannondale.com

CANNONDALE EUROPE
Cycling Sports Group Europe, B.V.
mail: Postbus 5100
visits: Hanzepoort 27
7570 GC, Oldenzaal, Netherlands
(Voice): + 41 61.4879380
(Fax): 31-5415-14240
(Email): servicedeskeurope@cannondale.com

CANNONDALE UK
Cycling Sports Group
Vantage Way, The Fulcrum, Poole, Dorset,
BH12 4NU
(Voice): +44 (0)1202 732288
(Fax): +44 (0)1202 723366
(Email): sales@cyclingsportsgroup.co.uk

CANNONDALE AUSTRALIA
Cycling Sports Group Australia Pty Limited
Unit 6, 4 Prosperity Parade,
Warriewood N.S.W., 2102, Australia
(Voice): (02) 9979 5851
(Fax): (02) 9979 5688
(Email): cannondale@cyclingsportsgroup.com.au

CANNONDALE JAPAN
Namba Sumiso Building 9F,
4-19, Minami Horie 1-chome,
Nishi-ku, Osaka 550-0015, Japan
(Voice): 06-6110-9390
(Fax): 06-6110-9361
(Email): cjcustserv@cannondale.com

Printed entirely on recycled paper with a minimum of 10% post consumer waste.